

# PUBLIC WORKS

city  
county  
and state

august  
1949

some of the articles  
in this issue:

Narrow Pavement  
Widening Procedures

Industrial Waste Treatment  
by Activated Sludge

Design Factors for  
a Clearwell

Refuse Collection and  
Disposal Practices

Diesel Engines Solve  
Municipal Power Needs

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Listed on Page 5

## OHIO STATE UNIVERSITY

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**1949 JULY**

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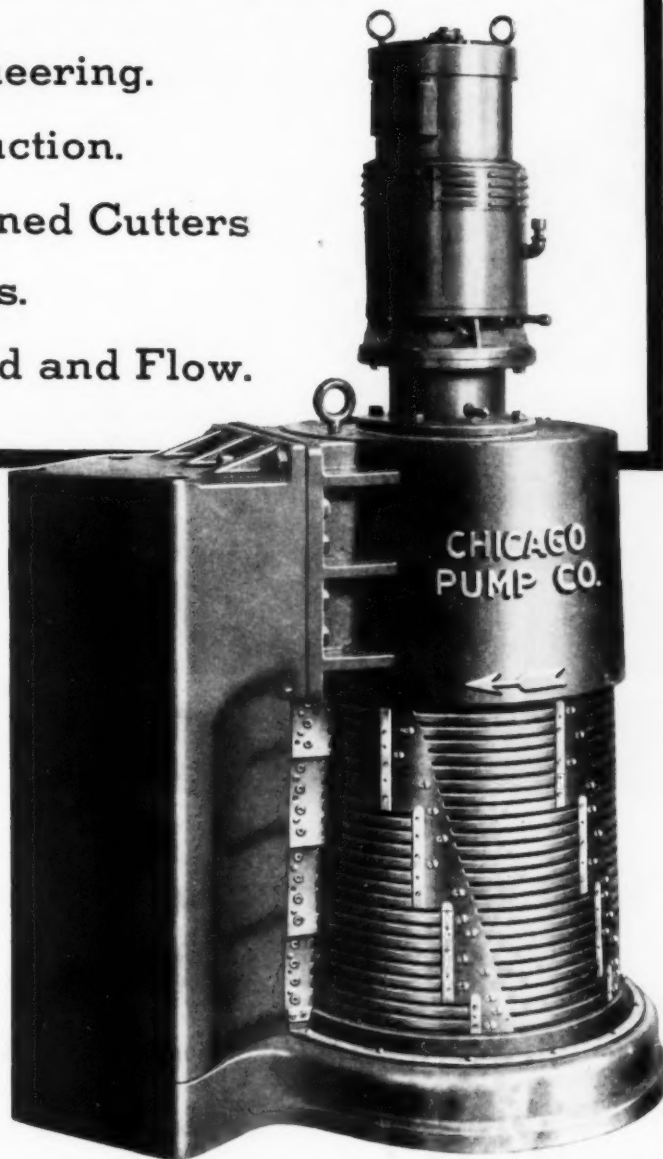
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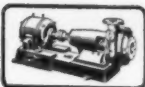
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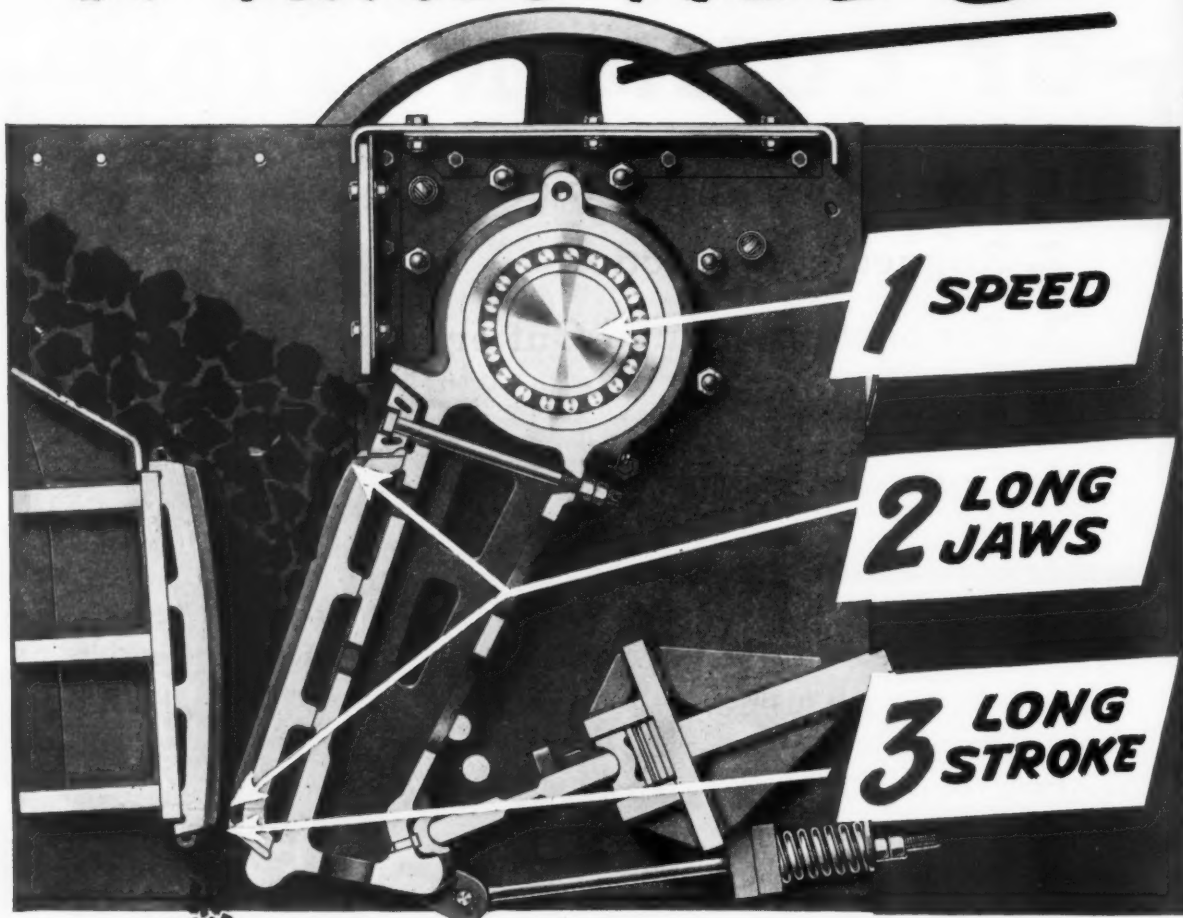


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# PUBLIC WORKS

THE ENGINEERING AUTHORITY  
IN THE CITY-COUNTY FIELD

Edited by  
W. A. HARDENBERGH and A. PRESCOTT FOLWELL

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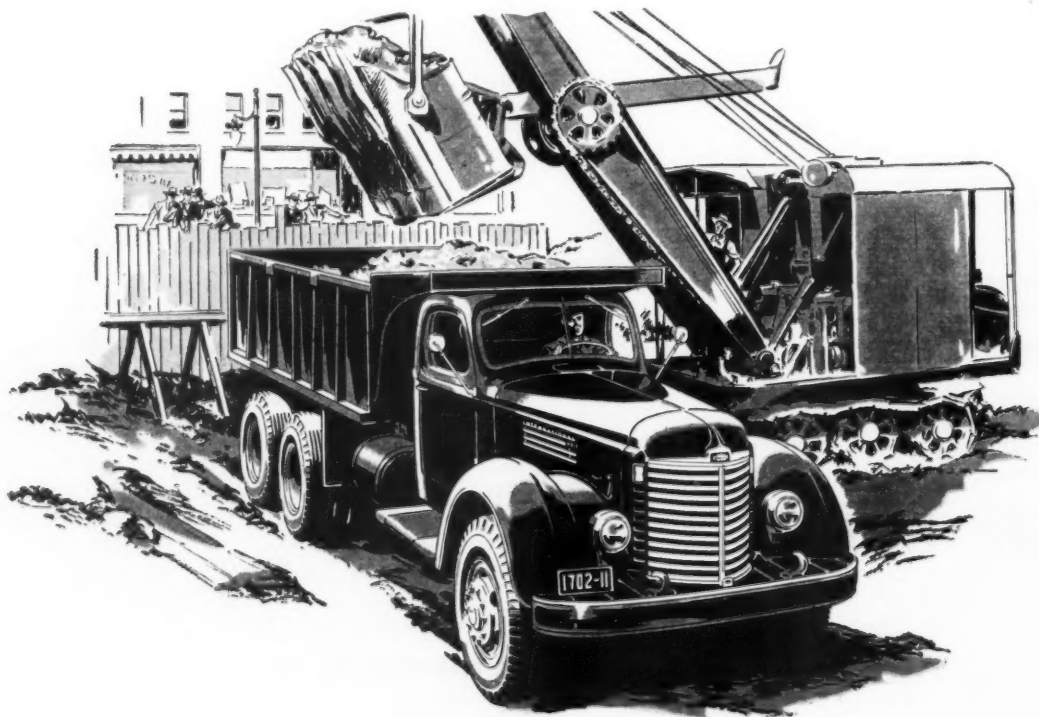
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# The EDITOR'S PAGE



## Quarantining Unemployment by Public Works

A proposal to "quarantine" unemployment was recently discussed in the Congress. It includes a flexible, long-range program of public works construction that could be "tremendously" expanded in times of unemployment, and reduced correspondingly when times are good. This is a sound idea, and it ought to be developed in a similarly sound manner.

The program must provide some means for selecting projects, processing them in whole or in part, storing them on the shelf, reviewing the inventory from time to time, taking out projects for current consumption, and adding additional projects to the inventory regularly. State or federal money is needed for the selection and planning, but this need is very small on the basis of present-day state and federal budgets.

We have many times stated that the existing provisions for public works projects are totally inadequate, not only in regard to the volume of work, but also as to the provisions for planning them and getting them under way when they are needed. When we need these public works projects, we are going to need them very badly, and they ought to be ready to go. There is no lack of suitable projects. There is scarcely a community in the country which after some eight years of depression and five years of war does not lack adequate streets or roads, water or sewerage facilities, refuse collection and disposal, schools, parks and playgrounds. It is time to get started.

## Creating and Operating Your Own Research Department

One reason that this country has forged ahead so rapidly has been the extensive research departments operated by practically all of our foremost manufacturers. But it is not necessary, nor is it desirable, to confine research solely to large concerns. Officials of many smaller companies mistakenly believe that research is possible only for the large organizations. No doubt it is true that small concerns cannot afford an extensive research department; but most of them can afford a one-man research organization which may be more efficient than a large one; it all depends on that one man.

For instance, every business must buy as well as sell. Here's how sound research can begin: Instead of asking for prices and selecting the cheapest item, try picking out the best-looking product and buying it, even though it costs more. The difference in cost can be charged to research (don't try this on the tax collector); or go a little farther and buy some of both—the cheapest and the one that looks best. Compare the two, side by side, under identical con-

ditions. You will probably find that it pays to buy quality products, instead of purchasing solely on a first cost basis. This is applied research, and a kind of worthwhile research that can be indulged in with profit by any business or industry regardless of size.

## A Straw in the Wind Toward Better Garbage Disposal

A bill has been passed by the Indiana State Senate which would permit communities to go into the garbage grinding business. It would provide that local government units might issue revenue bonds for purchasing and installing garbage grinders in citizens' sinks, charging a rental fee for them. Though this particular bill may not be workable, for it has some weaknesses, it does indicate the very strong trend toward disposal of garbage by grinding and discharge into sewers. Such a method of disposal has many advantages; opponents may say that it also has disadvantages. Mainly the disadvantages can be overcome, however, by the exercise of engineering knowledge that is now available to us. First cost will be greater; but when this country makes up its mind that something better is necessary, the money is always obtainable.

Separation of garbage from the other solid wastes will simplify collection and disposal, but will not eliminate the necessity for a well-organized and equipped collection service, nor for tested and proven methods of refuse disposal.

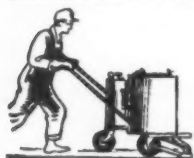
## Shade Trees and Sewer Stoppages

In the introduction of a proposed model ordinance, we find the following: "In the case of root stoppages, the planting of trees (particularly poplar and willow) near sewer lines could be controlled." We must differ with this implied recommendation. The roots of elms and maples, among the most popular shade trees, travel 25 to 50 feet to reach a leaky sewer, and the remedy suggested above would just about eliminate all such shade trees from streets in which sewers are laid or are to be laid.

Such a remedy is almost unthinkable and would never have the support of the taxpayers. Whether right or wrong, some citizens would prefer a sewerless to a treeless city. Besides it is the sewers that are at fault, and should be corrected, and not the trees. In the first place, if good pipe is used, with modern jointing materials, and the work is done properly—all of which ought to be done anyway—new sewers will have joints that roots cannot penetrate. If existing sewers are at fault, the remedy is not to cut down the trees, but to dig down and seal the leaking joints; or to use copper sulfate as has been done successfully in several places, to destroy the entering roots or prevent their growth within the sewers.



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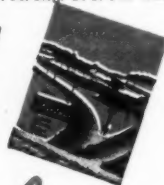
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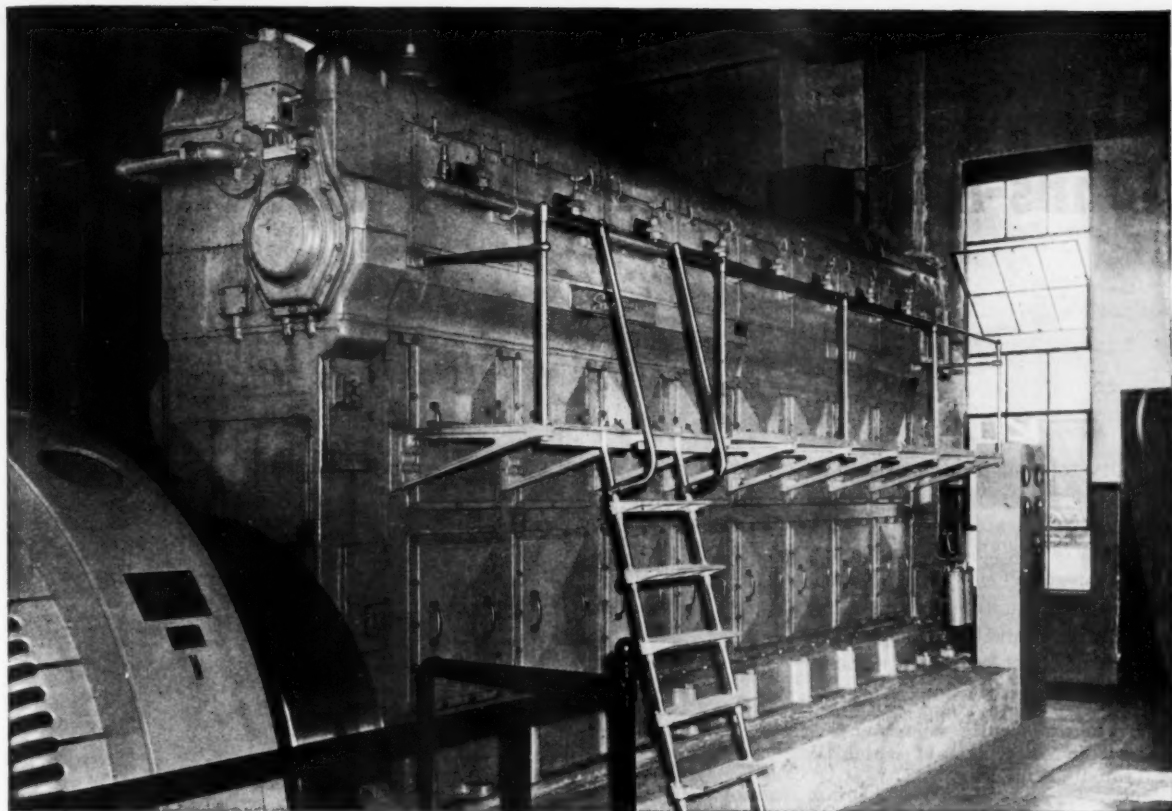


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# *Engineering Facts about*

## **Johns-Manville TRANSITE\* PRESSURE PIPE**

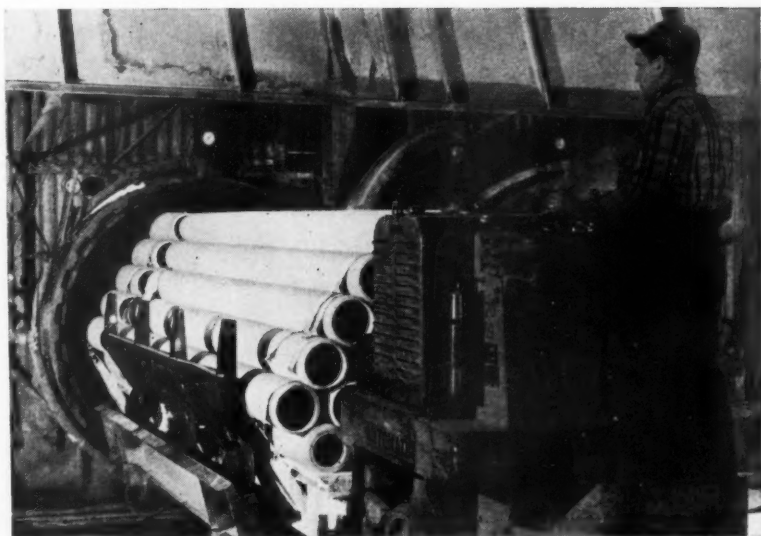
### *Resistance to Corrosion*

### *... an index of long life*

Ability to withstand corrosion is the most important single measure of the durability or life expectancy of an underground water pipe material. Two factors—both inherent in the pipe itself—contribute to Transite's exceptional ability to resist corrosion. These are:

1. The inherently corrosion-resistant materials of which Transite is made.
2. The specially developed manufacturing process—employed exclusively by Johns-Manville—which imparts a high degree of chemical stability to the finished product.

In the manufacture of Transite Pipe, the three basic ingredients, asbestos fibres, cement and silica



A load of Transite Pipe about to enter the steam curing tanks. This step in the Johns-Manville manufacturing process contributes substantially to the corrosion resistance of the finished pipe—and, therefore, to its long service life.



Transite Pipe was first used by this large west coast city in 1933. Its exceptional corrosion resistance—an index of long life—has already made it possible for Transite to outlive other pipe several times over.

—all basically corrosion-resistant by nature—are consolidated under tremendous pressure to form a pipe wall of dense, uniform, homogeneous structure. After forming, the pipe is subjected to a special steam curing process.

It is in this steam curing stage that so much is contributed to the stability and structural integrity of the pipe. Here under the action of pressure steam, Transite assumes a new chemical identity. The silica unites chemically with the free lime ordinarily associated with cement products and converts it into highly stable calcium silicates. As a result of this process, the cured pipe is unusually resistant to corrosive attack throughout its entire structure.

\*Transite is Johns-Manville's registered trade mark for its asbestos-cement pipe and other products.

This intrinsic resistance to corrosion has been substantiated by numerous Transite installations. Some of these have been exposed to highly aggressive soils, both alkaline and acid, for many years. Many are now serving as replacements under conditions so destructive that the useful life of the pipe materials previously used had been seriously curtailed.



Transite Pipe was installed in this Texas city ten years ago to replace another pipe material that had been destroyed by soil corrosion in 7 years. The Transite mains are still on the job today with a long useful life ahead of them.

In one such installation, a Transite main installed during 1932 in an extremely corrosive soil was recently made the subject of careful study to determine its condition. Sections of the pipe, including couplings, were dug up and shipped to the factory for test. There was no evidence of deterioration. Pipe and couplings readily withstood the original factory pressure test, equivalent to four times the normal working pressure of the line.



Like thousands of other communities, this West Virginia city selected Transite Pipe because it promised assurance of maximum life. Today, after 14 years of service, the first installation of Transite has already fulfilled this promise by outlasting the pipe material previously used.

Certain types of industrial service provide an even more severe "proving ground" for the life expectancy

of pipe materials, and here, too, Transite Pipe has demonstrated exceptional corrosion resistance. Coal mine service is a typical example. Here acid mine waters are frequently so corrosive that they have destroyed ordinary pipe materials in a matter of a few months or years. Yet Transite Pipe has handled these same waters under working pressure up to 150 lbs. for periods from 10 to 15 years with little, if any, indication of deterioration.



Corrosive soil conditions were so severe at this location in a prominent New England city that the life of the pipe material formerly used was only 15 years. Transite Pipe, put in as a replacement in 1934, continues to give the same efficient, dependable service as the day it was installed.

To evaluate the ability of pipe materials to withstand soil corrosion, the National Bureau of Standards has conducted an extensive series of field tests. These studies are based on examination of hundreds of pipe samples periodically removed from severely corrosive soils. In these and similar tests, Transite Pipe has consistently demonstrated its superior re-



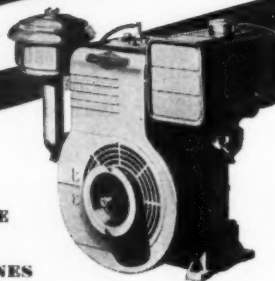
Transite's ability to provide long-term, dependable service is well illustrated by its performance in coal mines, where it consistently outlasts other pipe materials in carrying corrosive mine drainage waters. The 36" Transite line shown above has been conveying acid mine waters for 15 years.

sistance to soil corrosion, confirming the long life expectancy which this asbestos-cement pipe has evidenced in thousands of water works installations.

For further details about Transite Pressure Pipe, write Johns-Manville, Box 290, New York 16, N. Y.



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## Letters

### A NOTE FROM ENGLAND:

I have read with very much interest my first two PUBLIC WORKS magazines. You certainly pack in an amazing amount of useful information, while I find the Readers' Service Department a great asset. The speedy replies from manufacturers, who have been invariably courteous and helpful despite the rather remote chance of business with us here in Britain at the present, are very much appreciated.

You will be aware that experience in capital works is rather hard to come by over here now, so it is rather enviously that we read about the vast schemes and tremendous outlays that are progressing in the United States. My interest is primarily in highways and its ancillaries and I am planning to visit the states with a view to obtaining a wider experience in this branch of the profession. Would it be possible to forward me your 1949 Highway Manual when available—and indeed any literature which you might recommend for purchase (or otherwise) would be appreciated?

J. E. Reed,

Senior Engrg. Asst.,  
County Surveyor, Newport, England

(Ed. Note: We are glad to send the Highway Manual and we hope that when Mr. Reed visits this country he will take the time to stop off at our office. His letter is greatly appreciated.)

### SANITATION IN THE FAR EAST:

Greetings after so many months following my visit to your office in October, 1948, when I was preparing to journey out here for Standard Vacuum Oil. My organization of 500 men is shaping up very nicely. Our operations cover the refinery area at Palembang, the producing fields in Pendopo, South Sumatra, and Middle Sumatra, and the Tanker Station near Singapore.

Malaria control operates very satisfactorily under my Sanitation Inspector and foremen, who have been trained under Dutch short training programs. The Community Sanitation, the food handling and the in-

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secticide programs are in fine shape, as is the supervision of water supply.

I am now receiving PUBLIC WORKS regularly and enjoy this contact with the news. Your ASCE Committee on the Advancement of Sanitary Engineering seems to be helping our profession. More power to you all.

William L. Avrett,  
Sanitation Engineer,  
SVPM, Palembang, Sumatra.

(Ed. Note: Bill Avrett was formerly an engineer with the Georgia Dept. of Health. He served with the Sanitary Corps during the war.)

#### AN OLD WATER SYSTEM:

We have what we consider the oldest water works in Kansas. Of course, our first system has been rebuilt and discarded about twice. The first water works was mostly for watering horses and for fire protection, but this was enlarged and service to consumers was provided. We have a reservoir on the top of a hill; this was open at first, and provided 115 pounds pressure. To my knowledge, none of the system constructed prior to 1889 is now in use, except four fire plugs which were bought in 1876, five years after the first water works were built.

Our average consumption is 60 gals. per day per person, and 95% of our services are metered. Our population is 1,400.

Arthur E. Clear,  
Water Superintendent,  
Blue Rapids, Kans.

#### CONSTRUCTION COSTS:

There has been considerable discussion here as to whether street paving should be paid for from general revenue funds or should be financed, as is done presently, by tax bills assessed against abutting property owners. We have been informed that in some cities where the general revenue fund system is used and where the contractor is assured of his money, and not handed a bunch of tax bills, bids for pavement are consistently lower. We are interested in learning if this is true.

F. W. Slater,  
St. Joseph, Mo.

(Ed. Note: Anything that reduces the many hazards connected with contracting will usually result in lower costs. The contractor is not a financier; and if he handles tax bills and warrants and does not get his money until he can collect on them, his bid will naturally be higher. The city will do better to pay for the paving directly, and to collect from the property owners itself. Assessments can be based on normal methods; bonds can be issued; and these can be repaid through the returns from the property benefit assessments.)

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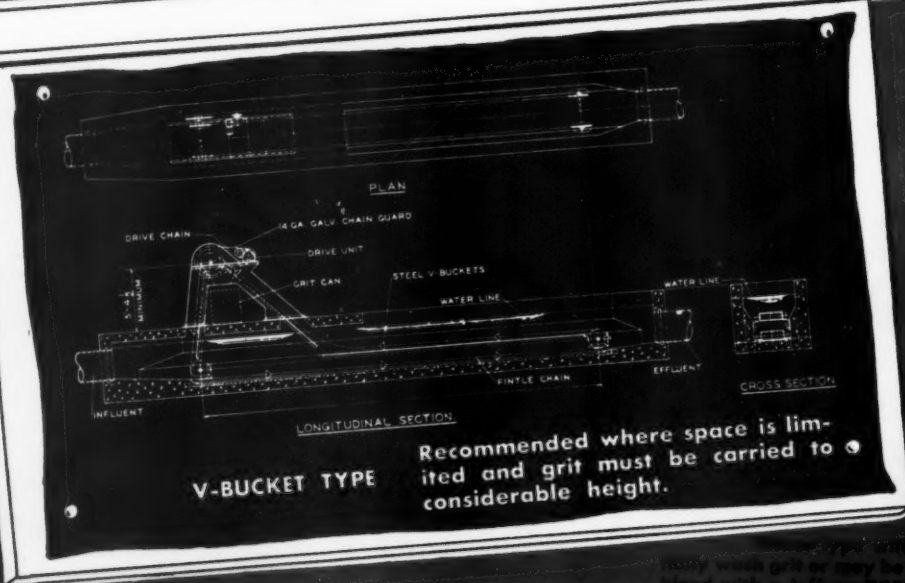
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When you need special information—consult the READERS' SERVICE DEPT. on pages 77-81

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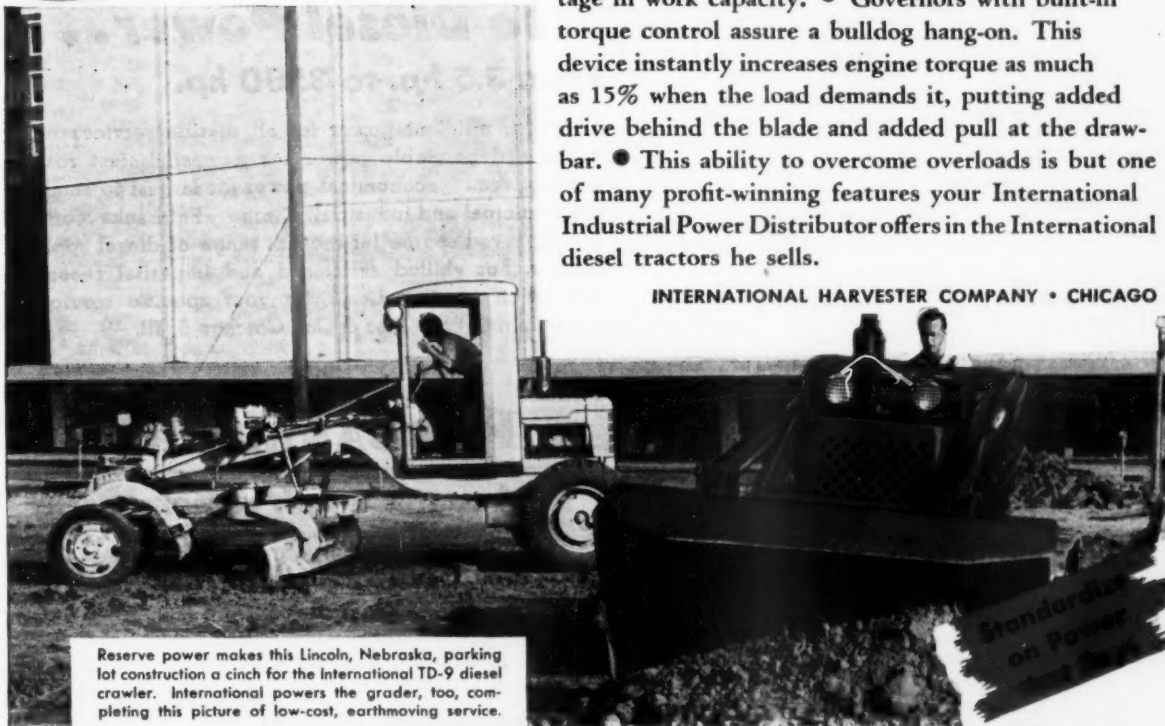
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*Hidden power* to pull through heavy going gives every International diesel crawler the winning advantage in work capacity. • Governors with built-in torque control assure a bulldog hang-on. This device instantly increases engine torque as much as 15% when the load demands it, putting added drive behind the blade and added pull at the draw-bar. • This ability to overcome overloads is but one of many profit-winning features your International Industrial Power Distributor offers in the International diesel tractors he sells.

INTERNATIONAL HARVESTER COMPANY • CHICAGO



Reserve power makes this Lincoln, Nebraska, parking lot construction a cinch for the International TD-9 diesel crawler. International powers the grader, too, completing this picture of low-cost, earthmoving service.

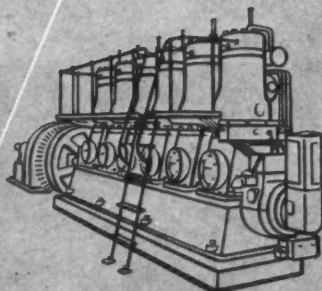
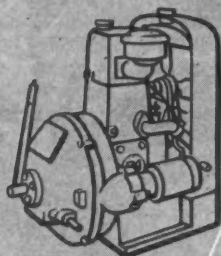
**CRAWLER TRACTORS  
WHEEL TRACTORS  
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POWER UNITS**



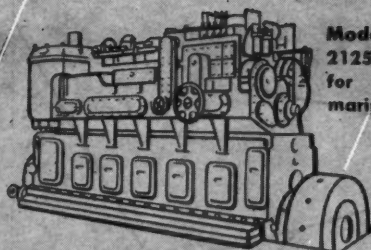
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**Model 45B: 5¼ horse-  
power engine for station-  
ary and marine service.**

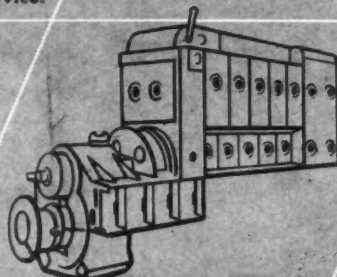
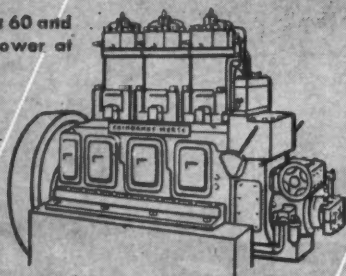


**Model 32: Horsepower from 120 to 450.  
For slow-speed heavy-duty service.**

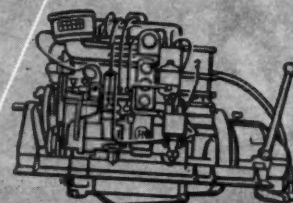


**Model 37: 500 to  
2125 horsepower  
for direct drive  
marine service.**

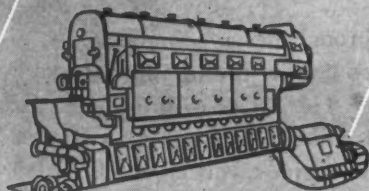
**Model 42: 60 and  
90 horsepower at  
450 r.p.m.**



**Model 31: Horsepower from 175  
to 500; with 2 to 1 reduction  
gears optional for marine service.**

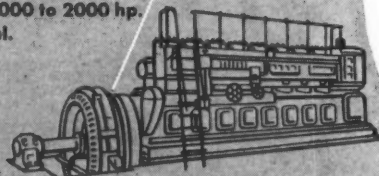


**Model 48 Marine Engine: Also  
available for stationary or port-  
able service. 3.5 to 80 hp.**



**Model 38 Opposed-Pis-  
ton Engine: Horsepower  
from 960 to 1920 with 2  
to 1 reduction gear for  
marine service.**

**Model 33 Stationary  
Engine: 500 to 2000 hp.  
Diesel, 1000 to 2000 hp.  
Dual Fuel.**



## **When it comes to Diesel Power... From 3.5 hp. to 3500 hp.**

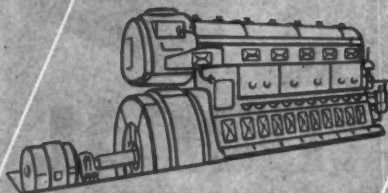
Low-cost, efficient power for all marine services... modern, dependable power for newest, fastest road locomotives. economical power for largest to smallest municipal and industrial plants. Fairbanks-Morse is the proved source for the full range of diesel applications. For skilled assistance and impartial recommendation for the diesel for your specific service, write Fairbanks, Morse & Co., Chicago 5, Ill.



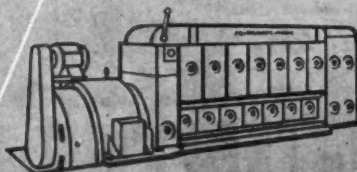
## **FAIRBANKS-MORSE**

### **A name worth remembering**

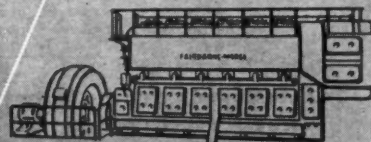
**DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES  
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR  
CARS and STANDPIPES • FARM EQUIPMENT • MAGNETOS**



**Model 38 Opposed-Piston En-  
gine: 960 to 1920 horsepower at  
720 r.p.m.**



**Model 31: Diesel generating set  
with kw. ratings from 118 to 360.  
Marine and stationary—Dual Fuel  
available in larger sizes.**

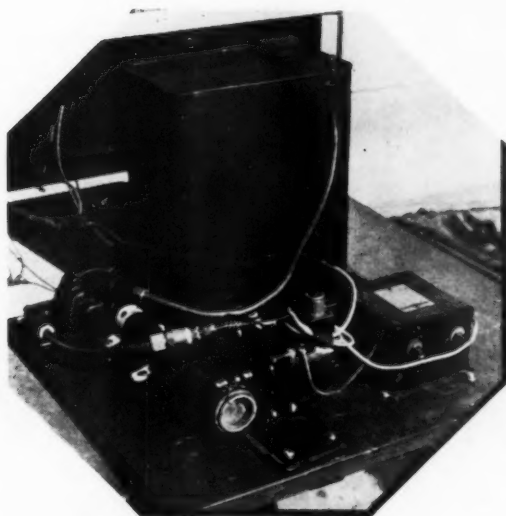


**Model 31: 2100 to 3500 horse-  
power diesel or dual fuel engine  
for heavy-duty stationary service.**

# PUBLIC WORKS MAGAZINE

AUGUST 1949

VOLUME 80 • No. 8



● THE WORKING parts of the exhibit are in the base and take current from a toy electric set.

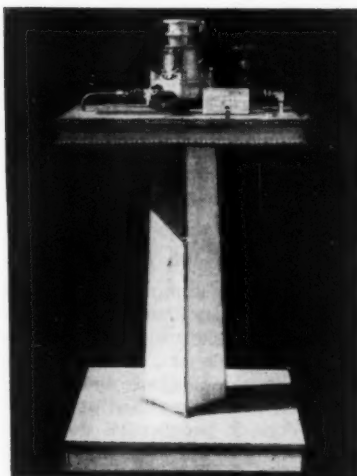
## Water Meter Display For Better Public Relations

M. J. SHELTON

General Manager and Chief Engineer  
La Mesa, Lemon Grove and Spring Valley  
Irrigation District

THE two accompanying illustrations show the installation of a display water meter, so arranged that the public may see all working parts of the meter in actual operation. Plastic plates were installed in the cutaway section on the side of the meter and in the disc chamber. A light was also installed to light the disc chamber. A person desiring to see the meter in operation merely presses the button located at the right front corner, and the light turns on and water begins to flow.

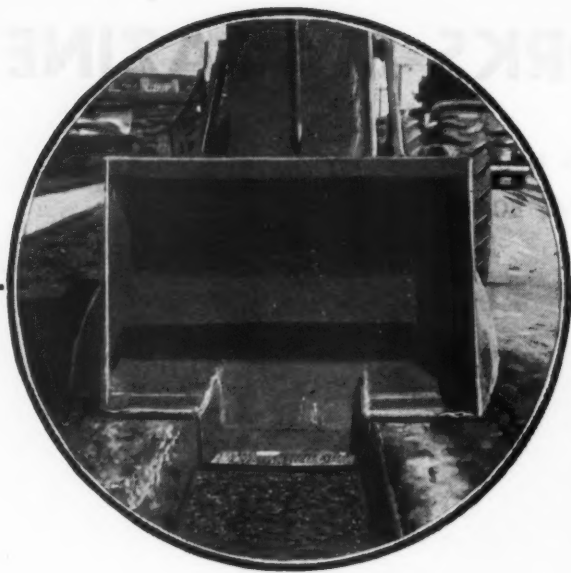
The working parts of the display



● THE CARD on the stand says "Press Button to Run Meter."

were all stored in the base of the pedestal. The transformer, which operates from a 120-volt supply, was taken from a toy electric set. It is set at 24 volts and furnishes power to a salvaged electric motor formerly used in an aircraft. The motor is connected to a Chevrolet oil pump which pumps water from the two-gallon can which serves as a reservoir. The water passes through the meter, then returns to the reservoir. The result is that the unit is entirely self-contained, not connected to any water supply, and therefore is portable.

This display is maintained in the main office in the vicinity of the counter where the public pay water bills. It helps to answer many questions of the public and, therefore, it is an added asset as regards public relations.



● **HOUGH loader, with specially constructed bucket, for excavating widening trench.**

**THE THIRD** article on North Carolina highway practices. The first, on patching procedures, was prepared by Mr. Davis, T. V. Fahnestock, Bituminous Engineer, and W. H. Rogers, Jr., State Highway Engineer. The second, on bituminous construction, was by Mr. Fahnestock.

## HOW NARROW PAVEMENTS

**B. W. DAVIS**

State Maintenance Engineer  
North Carolina State Highway  
and Public Works Commission

**T**HE program of road improvements initiated in the 1920s which resulted in building many miles of pavement has paid North Carolina big dividends but at the same time it has left the handicap of pavements too narrow for modern needs. It is difficult, and often almost impossible, to so maintain soil type shoulders as to prevent dual wheel trucks and buses from making ruts adjacent to the edge of 16', 18', and even 20' pavements. This condition is being remedied to a limited extent by widening the pavements. The widened area is made of a flexible base covered with a bituminous type surface. The base for the widened section is always made as thick or thicker than the old pavement. Bases are built with topsoil, sand-clay, sand-clay-gravel, gravel, crushed stone, sand asphalt or soil cement. Available local materials are used when practical. The widening is added on each side of the pavement and the width (on each side) is 2' or 3' (total widening 4' or 6'), depending on the width of the old pavement.

The widened area with flexible base and bituminous surface provides a transition between the rigid pavement and the soil shoulder. A



● **FRONT END loader on widening work loading into a truck.**

sod is usually obtained on the shoulder adjacent to the widening by planting Korean Lespedeza. The sod not only retards soil erosion but it also gives an area of sufficient firmness for emergency use. The widened area will later be used as a base for a bituminous surface which will be placed over the entire width—old pavement plus the widened strip.

### Complete Job Procedure

When the complete widening (base and bituminous surface) is done as a single project the base is compacted in layers, not more than 4 inches thick (loose measure); however, a large amount of widening is done in progressive stages. In the latter case the local material is placed in one layer. It is rolled with trucks and a motor grader and is then given a preliminary split-seal bituminous surface treatment, as



● **TRENCH** has been excavated with a Hough loader. A Ford truck is dumping aggregate into an Apsco widener for placement in trench.



follows: 0.20 gal. AE-3 per sq. yd. and 25 lbs. No. 11-A aggregate (95% to 100% passing  $\frac{1}{2}$ " square opening), followed by 0.25 gal. AE-3 per sq. yd. and 8 pounds No. 11-A aggregate.

After traffic and the elements have compacted this widened section and when conditions warrant and funds permit, the widened area and the old road are covered with a retread or a plant-mixed bituminous surface.

The equipment used in making the excavation and in placing a TBM base are shown in the tabulation. The excavation was made with a front end loader on a pneumatic tired tractor. The loader was equipped with a modified bucket having a special lip made to the exact dimensions of the excavation. The excavated material was loaded directly into dump trucks. A motor grader with a tooth scarifier preceded the front-end loader. The out-

received for the commercially produced stone delivered on the road and dumped into the State-owned spreader. The contract work included the unloading from freight cars (except Section 1 where the

Engineer, SH & PWC, Shelby, N.C.; P. D. Miller, District Engineer, SH & PWC, Statesville, N.C.; and W. H. Rogers, Jr., State Highway Engineer, SH & PWC, Raleigh, North Carolina.



● SELF-PROPELLED Apsco widener, with pneumatic tired tractor, conveyor and strikeoff, followed by an Allis-Chalmers motor grader.

## TS ARE WIDENED

side tooth in the scarifier (the tooth farthest from the pavement) was curved to the rear (the opposite direction from the curve on the other teeth) so as to cut a smooth edge on the side of the excavation away from the pavement. On the first trip with the scarifier only two teeth were used, one tooth against the edge of the pavement and the other (curved as a cutter rather than a rooter) at the outer edge of the excavation. Where additional scarifying was necessary an intermediate tooth, or intermediate teeth were added.

The excavation for the TBM was done immediately in advance of the placing of the TBM. As a general rule, no open trench was left at night. The excavation was made so as to make each day's work a complete job insofar as practical.

Traffic was maintained over the road during the time the widening was under construction. Two flagmen were able to maintain one-lane traffic around the equipment placing the TBM.

The aggregate used in Section 1 and Section 2 is granite and the aggregate in Section 3 is limestone. All the stone was purchased under a specification requiring 100% passing  $1\frac{1}{2}$ ", 80-95% passing 1", and 0-40% passing No. 4.

The work covered by the tabulations was done, as is indicated, partly by contract and partly by Highway Department forces. Bids were

stone was hauled 25 miles from the quarry), the hauling, and dumping into the hopper on the spreader. Highway Department forces did the excavating, furnished and operated the spreader, and finished the work with a motor grader. The

On the basis of the Municipal Rental Schedule of the State Highway and Public Works Commission, daily costs on three widening jobs were as indicated in Table 1, which shows the equipment and personnel used and the unit and total daily costs. On sections 1 and 2 the equipment and personnel used were identical and, hence, daily costs were the same.

Table 1—Daily Costs on Three Widening Jobs

	Unit Daily Cost	Daily Cost	
		Nos. 1 & 2	No. 3
Spreader .....	\$41.00	1 \$41.00	1 \$41.00
Motor Grader, H/Duty .....	40.00	1 40.00	1 40.00
Motor Grader, M/Duty .....	30.40	1 30.40	1 30.40
Pay Loader; 1-yd. diesel .....	28.40	1 28.40	1½ 42.60
1½-2 Ton Trucks .....	18.00	3 54.00	4 72.00
Gang Foreman .....	14.00	1 14.00	1 14.00
Gang Foreman .....	12.00	1 12.00	0 0.00
Laborers (excavation) .....	8.50	2 17.00	2 17.00
Flagmen .....	6.00	2 12.00	2 12.00
Pick-up .....	4.40	1 4.40	1 4.40
Car (for operator) .....	5.00	1 5.00	1 5.00
Totals .....		\$258.20.	\$278.40

spreader was a self-propelled pneumatic tired hopper, belt conveyor and strike-off.

The contractor had available for the work 12 large Ford trucks (F-8) with 5 cubic yard bodies and 5 small Ford trucks (F-6). All the trucks were utilized on Section 1. There is no record of the cost for hauling other than the unit bid price.

The work referred to above was done under H. E. Noell, Division

The "payload" bucket, as indicated in the accompanying illustration, was provided with a special lip designed to make a trench 2 ft. wide and 8 inches deep.

On Job No. 1, where the daily cost for equipment and wages was \$258.20, excavation and placing, spreading and finishing the widening strip was carried on at the rate of 789.3 tons per day, or at a cost of 32.71¢ per ton. On Job No. 2, 1,009.1 tons of stone were placed

Table II—Cost Data on Three Widening Projects

	Job No. 1	Job No. 2	Job No. 3
1. Length in miles .....	9.75	10.80	8.10
2. Tons of stone used .....	10,261	11,100	9,605
3. Tons per mile 4 ft. wide .....	1,052.4	1,027.7	1,185.8
4. Pounds per sq. yd. ....	897	876	1,010
5. Work days .....	13	11	7.5
6. Tons placed per day .....	789.3	1,009.1	1,280.7
7. Cost per ton			
a. Contract Work			
Stone at quarry .....	\$1.35	\$1.25	\$1.25
Freight .....	.....	.528	.924
Unloading cars .....	.....	.123	.0968
Truck haul .....	1.030	.427	.2292
Total .....	\$2.380	\$2.328	\$2.500
b. State Forces			
Excavate, place spread & finish .....	0.327	0.256	0.217
c. Total cost in place .....	\$2.707	\$2.584	\$2.717
8. Cost per mile .....	\$2,848.95	\$2,654.75	\$3,222.29
9. Ton-mile hauling cost .....	4.12¢	3.91¢	3.88¢

On Job No. 2, a part of the stone was handled by truck haul alone.  
Cost per ton was the same, but hauling cost was 8.06¢ per ton-mile.

and spread per day, and the cost, including excavation and finishing was \$258.20 per day, or 25.59¢ per ton. On Job No. 3, the daily wage and equipment rental charge amounted to \$278.40; 1,280.7 tons of stone were placed per day and the cost, including excavation and finishing was 21.74¢ per ton.

On Job No. 1, stone was hauled direct from the quarry and there was no unloading cost, as indicated in heading 7a of Table II. On Job No. 2, part was hauled direct from the quarry and part was unloaded by clamshell from freight cars at a

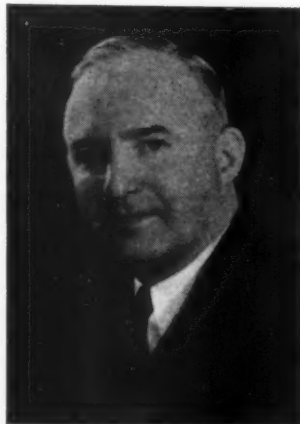
cost of 12.34¢ per ton, based on a daily cost for the clamshell of \$124.00 and a daily production of 1,009.1 tons. On Job No. 3, a ¾-yd. clamshell was used for unloading. This cost \$100.00 per day with operator; an oiler cost \$8.00 and two laborers \$8.00 each, a total of \$124.00. It handled an average of 1,280.7 cu. yds. of stone daily, giving an unloading cost of 9.68¢ per ton.

Comparative cost data on the three jobs are given in Table II, which shows the amount of stone used, tons placed per day, and cost per ton and per mile.

## LEADERS IN THE PUBLIC WORKS FIELD



Long one of our best known consulting engineers, Francis Friel was recently honored by Drexel Institute with the degree of Doctor of Engineering. He is president of Albright & Friel, consulting engineers; and past president of the Federation of Sewage Works Associations—to mention but a few of the positions he has filled. An officer of the Corps of Engineers in World War I, his firm, during World War II, designed and built many war service installations.



FRANCIS S. FRIEL

## Wider Expansion Joints for Concrete Roads

An English engineer, discussing the subject of concrete road joints in *Highways, Bridges and Aerodromes*, says: "With bays 60 ft. long, the seasonal movement at some joints may be as high as 0.4 in. With joints ½ in. wide as are commonly used, this movement amounts to a volume change in the joint of 80 per cent. It may well be that no material can accommodate such an amount of movement without cracking or failure in adhesion.

"The proportional movement is decreased if the initial width of the joint is increased and road engineers are asked to consider if there are likely to be any serious disadvantages in providing sealing slots at the top of the joints, at least ¾ in. and possibly 1 in. wide. The maintenance costs on future concrete roads would be considerably reduced if this practice were adopted."

## Cities Charge Sewer Rentals

More than 250 cities over 10,000 population and 199 cities between 5,000 and 10,000 population now charge sewer rentals, according to a survey made by the International City Managers' Association. Revenue from sewer rentals reported by 182 cities over 10,000 population totaled \$25,900,000 last year. Average sewer rental revenue collected by Buffalo, Cleveland, Detroit, and Philadelphia, the four largest cities having sewer rental charges, increased from \$1,607,000 in 1945 to \$2,458,600 in 1948.

Cincinnati, the largest of 19 cities that set up sewer service charges for the first time in 1948, received \$857,000 revenue from the sewer charge during its first six months. Louisville, which adopted sewer rentals in 1947, received more than \$1,200,000 during its first full year of sewer charge collections.—*Public Management*.

## Rolf Eliassen to MIT; Ingram Succeeds him at NYU

Dr. Rolf Eliassen has been appointed Professor of Sanitary Engineering, Massachusetts Institute of Technology and assumed his duties there on July 1. Rolf has been Associate Professor of Sanitary Engineering and Director of the Sanitary Engineering Research Laboratory at New York University, serving there since he returned from military duty. He will be succeeded at NYU by William T. Ingram, who has been on field duty with the American Public Health Association.

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## PORTABLE PUMP FURNISHES WATER For Soil Compaction

**A** BETTER method has been devised for adding water to fill material to provide the moisture content necessary to assure the density required by government specifications. This is a problem on many earth dam construction jobs in dry sections. At the San Angelo dam, near San Angelo, Texas, a portable pumping system was successfully used instead of trucks.

The San Angelo dam is being constructed across the North Concho River to provide both flood control and water storage for irrigation. Although the stream is normally only 75 ft. wide, it is subject to flash floods which cause rises of 20 to 30 feet very quickly. The dam will be 37,000 ft. long, with a maximum height of 128 ft., and a maximum width at the base of 750 ft. The final stage of construction involves the placement of more than 11,000,000

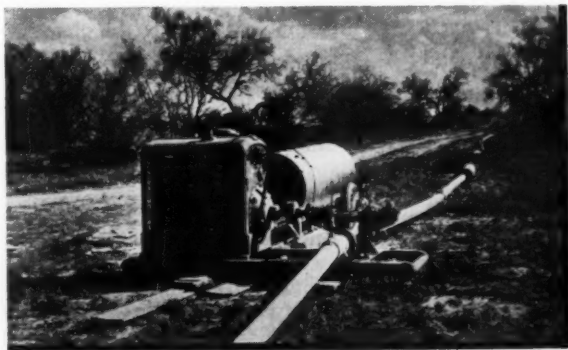
cubic yards of earth embankment.

The soil at the borrow area is so dry that 40 gallons of water must be added per cubic yard to permit compaction to the density of 95% specified by the Corps of Engineers. The portable pumping unit consists of a 3-cylinder GM Series 71 diesel engine direct connected to a Gardner-Denver 5-D centrifugal pump. This is mounted on a trailer. It takes water from the river and delivers it as needed on the project. Two booster stations, using identical units mounted on skids, are placed along the line. The pipe is 5-inch aluminum, in 20-ft. sections with mechanical joints which permit quick lengthening or shortening of the line. Each of the three engines has its own 330-gal. fuel tank.

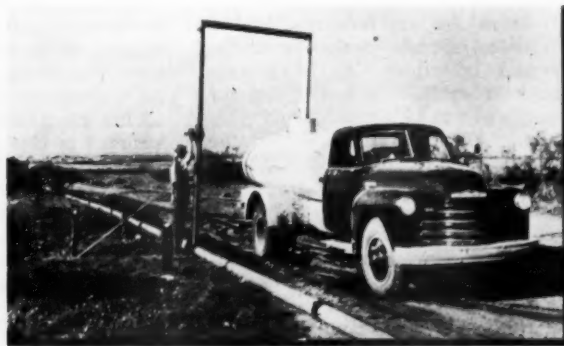
Water is lifted 9 ft. from the river and has been pumped through 17,600 feet of pipe, but this distance has

decreased as the work progressed; average length of line for the complete job will be about 11,600 ft. Maximum elevation of the discharge is about 110 ft. above the river. The pumps delivered an average of 650 gpm at maximum head and length of line, and with the shorter line will deliver about 850 gpm. This is the amount required for 20,000 cubic yards of dirt, which is the planned daily production on the basis of 1,200 working days for completion.

Another use of the pipe line is in the loading of watering trucks. At two points along the line, standpipes have been placed so that water trucks can pull under them and fill. A 1,500-gal. tank can be filled in three minutes or less. This arrangement not only saves considerable loading time, but reduces truck time and travel.



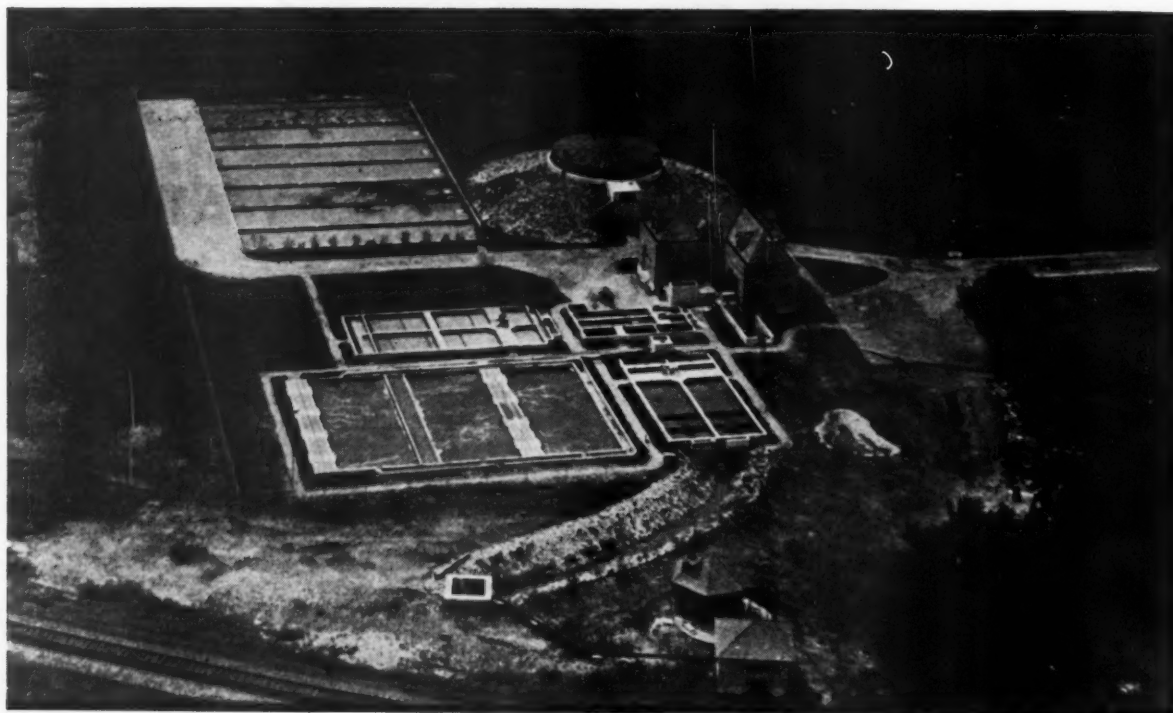
● ONE OF the two booster stations. Note fuel tank also skid-mounted, and aluminum pipe water line.



● STANDPIPE for filling haul-road sprinkler trucks delivers 500 GPM and eliminates long trip to river.

# TREATING INDUSTRIAL WASTES

*by the Activated Sludge Process*



● ACTIVATED SLUDGE plant at Celina, O., treats 0.6 MGD domestic sewage plus cannery wastes equivalent to 20,000 population.

**MILES LAMB**  
Chicago Pump Co.

THE activated sludge process provides reliable and economical treatment for most industrial wastes. As in all process work, the fundamental principles of the process must be applied properly for the specific job to be accomplished. This article gives information on the design of activated sludge plants where industrial wastes are to be treated and cites examples of existing plants treating these wastes. Nearly all sewage plants treat industrial wastes in a varying degree. In fact, it would be far simpler to describe the few activated sludge plants that do not treat industrial wastes than to describe all those that do.

An example of the adaptability of the activated sludge process to treat sewage with industrial wastes is given by the municipal plant at Madison, Wisconsin. Here a study was made of the results obtained by the activated sludge process at the municipal plant treating packing house wastes. It was found that the effluent from the activated sludge plant was of consistent high quality. As a result of this study, additions to the plant which are being constructed in 1949 are of the activated sludge type.

During the early years of the application of the activated sludge process, design was arbitrarily based on a six-hour aeration period and one cfm of air per gallon of sewage. These plants have given good results, but when subjected to exceedingly large amounts of industrial wastes the operation would become critical due to the relatively large

overload caused by these wastes. In the light of present day knowledge this critical operation was to be expected, since for the same detention period the amount of air required is proportional to the strength of the sewage and no provision was made in the design for the increased air supply. Also, since the plant was already operating at the upper capacity limits, any sudden increase in loading would cause further operating complications giving rise to the legend that "shock" loads are difficult to handle.

## Design Factors

During the past years much has been learned about the fundamental principles of design of activated sludge plants treating industrial wastes. The Chicago Pump Company has carried on extensive research, both in the laboratory and on plant scale, to obtain basic design

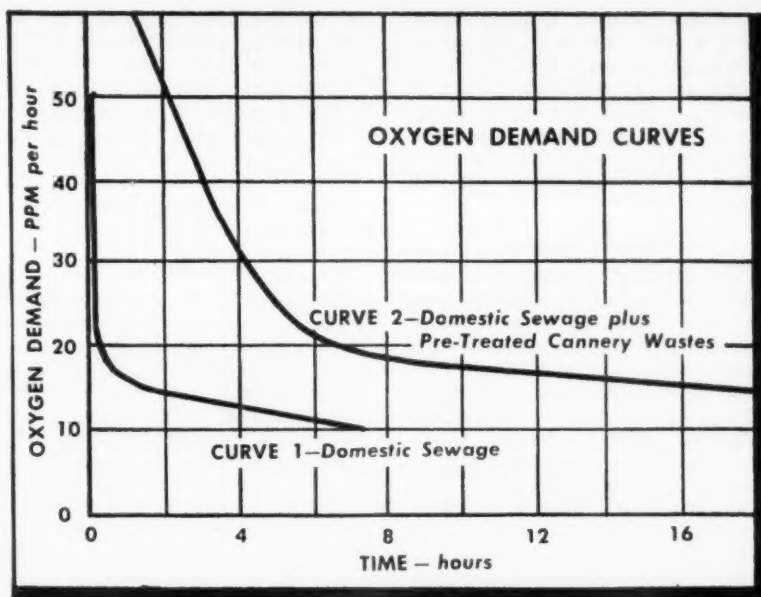


data for activated sludge plants treating industrial wastes. Plants constructed in accordance with this information provide a consistently high degree of treatment at reasonable cost with ease of operation. A so-called "shock" load is not a shock load when it is evaluated and allowed for in the design of the plant.

Curve 1 shows a typical oxygen demand curve with domestic sewage. Such a curve may be determined by the use of an Odeometer. A study of the curve shows that the initial demand is rather high but that it lasts for a relatively short period of time (30 minutes) and that the curve flattens out, in a six to eight-hour period, to approximately one quarter of the initial oxygen demand. This curve is typical of all domestic sewage and experience shows that when the oxygen demand is reduced to about one quarter of the original demand good treatment is accomplished. The correct aeration period is the time necessary to reduce the demand to  $\frac{1}{4}$  or  $\frac{1}{5}$  of its original value. The correct amount of oxygen to be furnished during the aeration period is indicated by the area under the curve.

Curve 2 shows the oxygen demand of the same sewage with the addition of 33 per cent by volume of industrial wastes from a corn canning factory. A study of this curve shows that the initial oxygen demand is higher than that given by purely domestic sewage and that this high demand lasts for a  $4\frac{1}{2}$ -hour period instead of the 30-minute period for domestic sewage. The time necessary to reach one-quarter to one-fifth of the initial demand (correct aeration period) is sixteen hours instead of the six to eight hours necessary for domestic sewage previously shown on Curve 1. For the domestic sewage 0.8 cfm of air per gallon are required for successful treatment and in the second case (with the industrial wastes added) 1.8 cfm per gallon of sewage treated are required.

It is information such as outlined above that gives basic facts which lead to the successful design of activated sludge plants for treating industrial wastes. Research such as this on many types of industrial wastes has shown that the detention period is proportional to the strength of the sewage and that the amount of air necessary per gallon of sewage is also proportional to the strength and composition of the sewage. For this reason it is necessary to evaluate the BOD of the combination of sewage and industrial



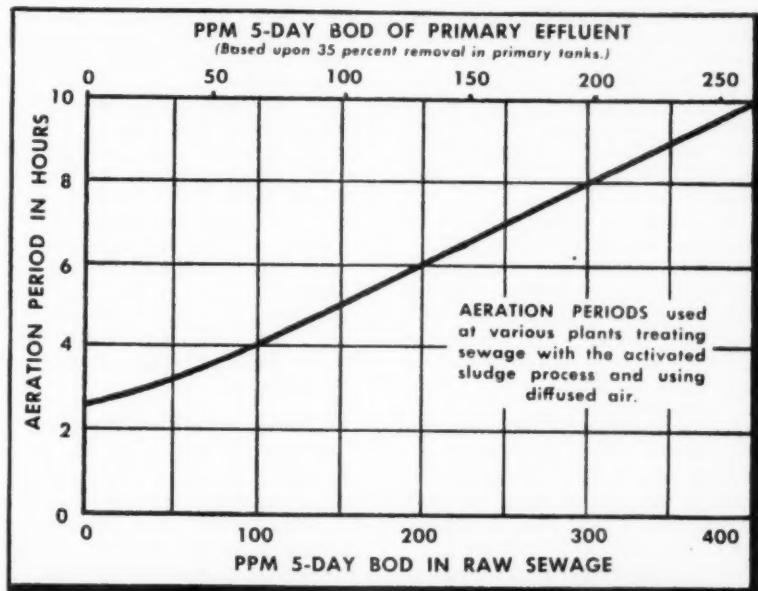
wastes to be treated on an approximate basis and figure the detention period and amount of air accordingly.

Curve 3 shows the recommended detention period for various strength sewages, using diffused air aeration. Starches and proteins in the sewage often affect the treatability of the sewage.

Investigations show that most industrial wastes are amenable to treatment by the activated sludge process and that relatively few industrial wastes are actually toxic to the organisms. For this reason most industrial wastes can be success-

fully treated if proper allowance for them is made in design.

Either mechanical aerators with flexible oxygenation capacity or diffused air aeration may be used for activated sludge plants treating industrial wastes. The oxygenation capacity of the "Chicago" air diffusion units can be increased as needed by the addition of more tubes on the header. The oxygenation capacity of the "Chicago" mechanical aerator can be increased by providing more tank turn-overs. The mechanical aeration units are recommended for plants treating up to 0.5 MGD. Diffused air aeration



● CURVE 3. Aeration period on basis of sewage strength.

is recommended for all larger plants since greater operation economy is obtainable through the use of digester gas to operate the blower in the larger plants. In treating a very strong industrial waste it may be economical in some cases to use diffused air on plants smaller than 0.5 MGD.

### Cannery Wastes

The activated sludge process is highly successful in the treatment of cannery wastes. An example of an activated sludge plant treating these wastes is Celina, Ohio. This plant treats approximately 0.6 MGD of domestic sewage and 0.3 MGD of domestic sewage. The equivalent population of the cannery industrial wastes is 20,000. This plant also treats the wastes from a creamery with a population equivalent of 2,500. The domestic population is 5,000, making a total population equivalent of 27,500. The 1947 average BOD of the raw sewage was 508 ppm and the average BOD of the final effluent that year was 32 ppm, a reduction of 93 per cent. In 1943 the cost per capita per year for the operation of this plant was \$0.83.

### Packing House Wastes

The activated sludge plant at Marshalltown, Iowa, is treating packing house wastes, together with domestic sewage and cannery wastes. The design flow of the Marshalltown plant is 4.0 MGD. In 1947 the yearly average BOD of the raw sewage was 348 ppm and the average BOD of the final was 30 ppm, a reduction of 91 per cent.

At Wapakoneta, Ohio, the activated sludge process is used to treat rendering wastes from the plant of G. A. Wintzer and Son Company. This plant processes about 40,000 pounds of meat scraps daily to produce white tallow for soap manufacture and meat scraps for live stock feed.

The treatment works designed by Paul Uhlmann & Associates, Columbus, Ohio, consists of sewage pump, line feeder for pH control, primary tank, aeration, final settling tank and sludge storage tank. Aeration is by diffused air. Sand filters for straining the effluent are provided for emergency use.

During 1948 this plant treated an average flow of 140,000 gpd with an average raw BOD of 620 ppm. The BOD of the effluent from the final settling tank was 11 ppm, representing a reduction of 98 per cent.

At the Kuehner Packing Company, Muncie, Indiana, the activated sludge process is used for treating

the packing house wastes. There is no domestic sewage included. The plant design is 0.5 MGD. Tests made in 1948 show that the plant is giving a BOD reduction of 84 per cent.

Other activated sludge plants treating packing house wastes are Marion, Indiana; Belleville, Illinois; Chicago Southwest; and Omaha, Nebraska.

### Milk Wastes

There are many activated sludge plants treating milk wastes. Among these are the plants at Bryon, Ohio; Ladd, Sandwich; Harvard, and Belvidere, Illinois; and Somerset, Pa. The Sandwich, Illinois, plant has a design flow of 0.025 MGD. In 1946 the average BOD of the raw sewage was 610 ppm and the final 44 ppm, giving a reduction of 93 per cent.

The H. W. Walker Company milk plant at Somerset, Pa., has an activated sludge plant treating milk wastes only, with no domestic sewage included. A three-year average shows that the raw BOD of 545 ppm is reduced to 7.4 in the final.

A similar installation is located at the White Mountain Creamery Company, New Bremen, Ohio. At this plant tests show that the raw sewage BOD was 1285 ppm with 4.8 ppm in the final.

### Acid Pickling Liquor

Waste acid pickling liquors from the steel and foundry industry are being treated at the Gary, Indiana, activated sludge plant and at the Cleveland, Ohio, activated sludge plant. At Gary 308,601 pounds of iron were received at the plant in 1947. Metal processing wastes are also being treated at the activated sludge plants at Belvidere and Belleville, Illinois.

The problem of diffuser media clogging when iron wastes are present in the sewage is solved by using swing diffusers which enable the diffuser media to be cleaned easily in a short time without reducing the capacity of the plant since the diffusers may be cleaned without taking a tank out of service. To maintain design flow with stationary diffusers extra tanks for standby service are required while diffusers are being cleaned.

### Textile and Other Wastes

At Newton, North Carolina, textile wastes are being treated in conjunction with the domestic sewage of the community. The 1939 yearly average BOD of the raw sewage was 398 ppm and of the final 15 ppm. The average flow in 1939 was 0.375 MGD. The plant consists of

comminutor, chemical feeder, primary tank, two Chicago Combination Aerator-Clarifier units, and separate sludge digester.

The chemical feeders were incorporated in the design to provide additional capacity through greater removals in the primary tank than is obtained by plain settling.

Examples of activated sludge plants treating general and industrial wastes are Lake Charles, La.; Milwaukee, Wisconsin; Indianapolis, Indiana; Mattoon, Illinois; Columbus, Ohio; Gary, Indiana. Diversified industrial wastes are found in almost all cities and for this reason many other examples of plants treating this type of waste may be found.



● MULTIPLE drill installation sinks 5 holes in 30 seconds.

## MULTIPLE DRILLS used TO CUT STREET

To remove the outer two of four sets of streetcar tracks from San Francisco's famous Market Street and prepare for re-surfacing, Eaton & Smith employed an unusual unit to line-cut along curbs and tracks before excavating. Cutting of the asphaltic concrete surface and concrete base material was done by a row of 3-inch, automatic-feed, drift-er drills, mounted in quickly adjustable saddles on a heavy crossbar. By using a "new standard" Jaeger 600-cu.-ft. compressor on the unit, the contractor was able to add a fifth drill, thereby increasing his daily length of cut 25%. A row of five 2 1/2" holes, 12 inches apart, was drilled in about 30 seconds. The truck was then shifted 6 inches and a second series of holes drilled between, and one hole beyond, the first series before the truck moved on to the next drilling position. This preparatory cutting prevented over-break on the pavement when excavating.





vent plugging by surf and wind-borne sand.

A serious problem was presented by Lookout Point—a headland 1100 ft. long, rising abruptly at the north end of the lagoon and spit from a narrow beach to a height of 260 ft. above sea level. This headland had to be passed, and two alternatives were considered—carrying the road around the headland, on a fill, with a very heavy sea wall as a protection against the surf; or building it through the headland in a cut as deep as 220 ft. on the hill side. Deep borings indicated that, with proper benching of the slope, stability for such a high cut could reasonably be assured. Study showed that the latter alternative would be less ex-

over three-fourths of which will be used in the work. Where fills on the sandspit toe out into the lagoon, creek gravel will be used for the under-water portions to permit percolation of lagoon water to the sea.

A feature of the project occurs at Stone Lagoon Summit, where it is entirely impractical, as well as prohibitive in cost, to provide a two-lane passing sight distance. Instead, a four-lane section has been designed as a safety measure to extend over the summit for reducing the possibility of accidents.

The new road will be 0.52 mi. shorter than the old; will have 11 curves, all of 500-ft. radius and over, as compared to 113 curves on the present road; a maximum grade of



● THIS IS AN AIR VIEW of the sand spit, with the Pacific Ocean at the right. White line shows route of the new location.

pensive, give slightly better alignment, and provide a natural protection from the surf. It was adopted and a contract for its construction was let in April, 1949.

The 220-ft. cut will have a 1:1 slope, with benches 25 ft. wide at intervals of 60 ft. vertically, involving the excavation of 376,000 cu. yd.,

6.5% against 7%; and total rise and fall of 292 ft. as compared to 843 ft. on the old alignment.

This is a condensation from an article by Mr. Redden in *California Highways and Public Works*. The illustrations were furnished us through the kindness of K. C. Adams, editor of that magazine.

## Milwaukee Conserves Water

John Hubel

As in 1948, summer regulations restricting the use of water for sprinkling lawns during certain hours of the evening are now in effect in Milwaukee, commencing in June and continuing until Sept. 15th. These provide that householders with even house numbers do not use water for lawn sprinkling on Tuesdays, Thursdays and Saturdays; while those in odd numbered houses

must refrain from water use for that purpose on Mondays, Wednesdays and Fridays. Violations are subject to fines from \$1 to \$50.

In the suburbs which get water service through the Milwaukee water works system, the village of Fox Point, north of Milwaukee, has restricted the use of water for lawn sprinkling from 8 a.m. to 8 p.m. on Mondays, Wednesdays and Fridays and on Sundays from 8 to 3, for all houses with odd numbers. For the

even numbered houses the use of water for sprinkling purposes is restricted for the same hours on Tuesdays, Thursdays and Saturdays, and from 8 to 3 on Sundays. The ordinance provides a fine of \$1 to \$50 for violations.

Other suburbs of Milwaukee have not announced regulations covering water use; but Wauwatosa, adjoining Milwaukee on the west, which has its own deep well water supply, has restricted the use of water for lawn sprinkling to certain days of the week. For instance, householders with odd numbered houses may use water on uneven calendar dates, while those with even numbers may use the water for that purpose on even calendar days. Houses with two street numbers may use the water for sprinkling on odd calendar dates. The ordinance covers the period of June 1 to Oct. 1, with fines of \$5 to \$10 for violations.

## Wet Weather and Sanitary Fills

A number of cities that operate sanitary fills have experienced difficulties in rainy weather due to the equipment bogging down in mud at the fill. Jean L. Vincenz, Director of Public Works of San Diego County, Calif., suggests, as a preventive of this, more complete and positive compaction of the fill in layers, using a reasonably heavy tractor; and, instead of covering the entire area with cinders or gravel, concentrate this on roadways or lanes for the trucks, with careful grading of the top to obtain drainage of the surface. A suggestion by the APWA "News Letter" is the purchase of surplus metal airplane landing mats.

## Cost of Laying Water Pipe

Cost data on water pipe laying are available from Little Rock, Ark., for the calendar year 1948. The cost for 2-inch wrought iron and steel pipe, including labor, material and miscellaneous items, was \$1.00 per foot. On the various jobs, the cost per foot ranged (for jobs more than 100 ft. long) from 47¢ to \$1.48; a total of 32,203 ft. were laid. For 3-inch pipe, of which 1,723 ft. were laid, the cost for cast iron averaged \$1.61 per foot. For 6-inch cast iron pipe, the average cost on 14,658 ft. was \$3.28 per ft., which included 29 6-inch and 1 2-inch valves.

The cost for 8-inch pipe, based on 9,852 ft., including 18 8-inch and 13 6-inch valves, was \$4.04 per ft. For 1,305 ft. of 12-inch cast iron, average cost was \$4.54 per ft.



# DESIGN FACTORS for a Clearwell

**ALBERT M. ELDRIDGE**

Design Engineer, City of Austin, Texas

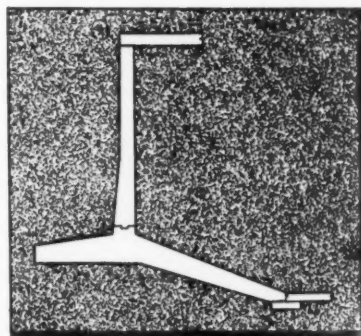
THE latest addition to the Austin, Tex., water plant is a 3 million gallon clearwell. This clearwell is connected to the original clearwell with a 30-inch equalizing line, a 30-inch pump suction line and overflow and drain piping. These connections are so arranged that during times of inspection, cleaning and repair either clearwell may be used independently. The plant now has a capacity of 34 mgd.

The new clearwell is rectangular, 84 feet by 301 feet with 16-foot depth. General design features of the clearwell include a cantilever wall with inclined base; and a flat slab roof with complete earth backfill to give an 18-inch earth cover for temperature protection both to the structure and to the water.

The clearwell is situated just south of the filter plant and about 200 feet north of the Colorado River. The bottom of the clearwell is about 14 feet above the river water surface. A series of four dams now serve to maintain the river at a uniform level at this point.

An unusual soil condition was found at the clearwell site. This site had been used many years ago as a dumping ground. Due to the effects of many floods in the past, it was found that parts of this old dump had been eroded and later replaced by sedimentation of sandy material upon subsidence of the waters. In several places a partial excavation revealed a well consolidated stream deposit of sandy material, and upon further excavation evidence was found of the dump underneath the deposit. The actual foundation material consists largely of hard clay with variable quantities of sand size particles.

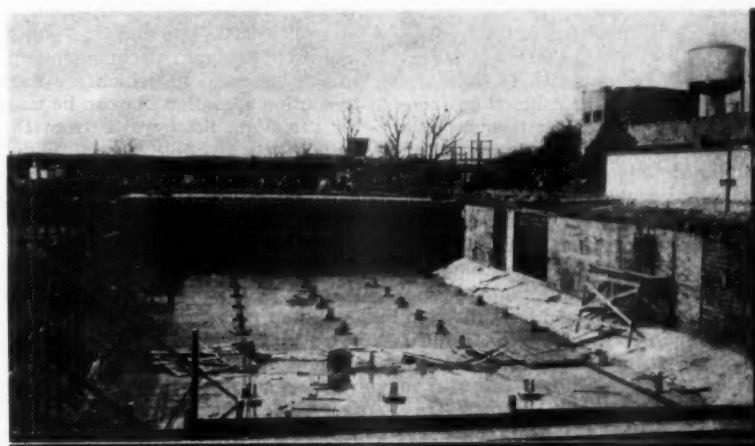
The floor was placed in three slabs; the largest being 64 feet by 101 feet. Special attention was given to the reinforcement of these slabs. Column footings were trowel finished and coated with asphaltum to allow a sliding contact to the floor



● WALL section of the new 3 MG clearwell, showing footing and flat slab roof construction.

ings; however, the construction joints served partially to relieve temperature and shrinkage stresses as was evidenced by a slight opening or closing of these joints with large temperature variations. The wall footing on one side (315 feet long) and one floor slab had been placed in 70 degree weather and later withstood an air temperature of  $-2^{\circ}$  without any visible crack except at construction joints.

The roof is a flat slab designed to carry 18 inches of earth and a 3-ton equipment load for placing the fill on the slab. The Contractor elected to use a small farm tractor with bulldozer attachment for moving



● CONSTRUCTION view of the new clearwell, showing floor, walls and footings. Austin's filter plant is shown at the right.

slab. Another feature of the column footings was a continuous vertical copper waterstop connecting the footing to the floor slab. This waterstop was provided with a V-crimp for flexibility. Connection between floor slab and column pedestal was made with premoulded joint material on top of which 2 inches of mastic was poured.

Walls and wall footings were arranged with vertical construction joints suitable for maximum use of mill lengths of reinforcing. These construction joints were provided with keyways and crimped copper waterstops. No expansion joints were provided in walls or wall foot-

this fill onto the roof slab. Sliding contact is provided where the edge of roof is supported by the wall.

Asphalt emulsion was applied to the roof slab in two coats for waterproofing; sufficient time being allowed after placing the concrete for development of pores before applying the asphalt. After the emulsion was dry, an earth cover two inches thick was placed on the roof to afford protection to the waterproofing.

## Curing Methods

Special attention was given to curing of concrete. A paraffin base curing agent was sprayed on the concrete in two applications while

the concrete was still damp. In the case of walls, these surfaces were kept damp with water spray until ties were broken back and voids filled. Then the curing agent was applied. These procedures assured a minimum loss of water from the concrete.

An air-entraining agent was used to aid concrete workability, and vibrators were used for consolidation of the fresh concrete.

#### Testing the Structure

Upon completion of the structure, it was tested for watertightness. The loss was approximately 1 3/4 inches in three days. The structure was then emptied.

A number of air pockets were found in the asphalt at column pedestals. These were repaired along with three fine cracks in the vertical

walls which had been in evidence during construction. One of these did not leak during the test, but it was repaired for future reliability. No cracks were found elsewhere in the structure. After repairs were complete the structure was back-filled and covered.

It is believed that good weather, proper concreting procedures and proper curing were largely responsible for the fact that no troubles were encountered on the project.

J. M. Odom, of Austin, Texas, was the Contractor at an approximate cost of \$112,000, which did not include valves or piping.

Walter E. Seaholm is the Director of Utilities, and Albert H. Ullrich is the Superintendent of Water and Sewage Treatment. Plans and specifications were prepared by the author.

### Emergency Equipment at Chicago's South District Filtration Plant

The provisions made for emergency equipment for Chicago's South District Filtration Plant in the original design have been supplemented by suggestions from the operating department based on their experience. The present emergency equipment therefore represents the combined judgment of many people in both design and operation of what is required to maintain service.

Emergency equipment is provided to maintain service, either complete or partial, under abnormal operating conditions, which might result from power failure, flooding, ice, failure of chlorinating equipment, fire, explosion, or other causes.

To provide against failure of incoming current, there are one 200 and one 280-ampere-hour storage batteries; two turbo-generator sets; small storage battery lights which go on automatically when the power fails; and a gasoline-driven pump for the hydraulic pressure system for filter valves. These units are designed to provide lighting at critical locations; actuate necessary gauges; operate chlorine equipment, portable electric gate operators, and hydraulic valves; and provide compressed air.

Two connections have been provided to which fire engine pumps can be connected to furnish high-pressure water for operating chlorinators, hydraulic valves and other purposes.

To take care of flooding of the lower parts of the plant from breaks in pipe lines, overflowing of basins,

filters or other units, there are provided four 7,500 gpm transfer pumps; a 2,000 gpm turbine pump; and two 700 gpm drainage pumps in the boiler room, which are used in routine operation but can be used for removing flood water from the under area. Overflows are provided in each settling basin, the raw water headers and the elevated washwater tank.

To prevent the formation of ice in the eyes of pump impellers, the temperature of the water entering the pump is lowered by introducing live steam at quarter points on each 48" and 54" suction pipe.

Chlorine ton cylinders, when in use, rest in tanks which can be flooded with caustic soda if a major

leak should develop. In the chlorine scale room are two 1 1/2" water jet ejectors with suction hose to pick up small chlorine leaks, and exhaust and supply ventilating fans, each of 12,000 cfm capacity. Gas masks are also provided.

Emergency fire equipment includes hose and extinguishers located at various points, fire doors on the carbon storage floors, hydrants outside the building; and, in the boiler room, quick-closing weighted valves with fusible links on the oil suction lines where they pass through the outside wall.

These data are from an article by F. G. Gordon, Assistant City Engineer of Chicago, in *Pure Water*, published by the South District Filtration Plant.

### Radio Frequencies for Highway Departments

The importance of highway operations and the necessity for using short range radio in this work has been recognized by the Federal Communications Commission. Authorizations for stations will be issued to states, territories, counties, cities, towns and similar governmental units. These may transmit communications directly relating to public safety and the protection of life and property; also communications relating to official activities covering the maintenance, supervision and operation of public highways. The ruling went into effect July 1, 1949.

Mobile relay stations in the Highway Maintenance Radio Service will be authorized only on frequencies above 152 megacycles, but a showing of need will be necessary. Frequencies in the 46-47 megacycle band will be assigned to highway departments on a geographical basis.

### Speeding Sewer Work and Saving Money

By using a truck-mounted Hydrocrane, the Milwaukee, Wisc., Sewer Department, has speeded up digging of storm inlet overflows and catch basin trenches. The Department digs about 600 of these trenches each year and the use of the Hydrocrane has reduced costs about 30% as compared to hand labor. Although used principally for trenching, the machine is also utilized to set sewer pipe; place valves, fittings and hydrants on water lines; and, with a special bucket, clean catch basins. This particular unit has a telescoping boom which permits work in close quarters and under trees and wires.



Hydrocrane, under low tree branches, digs trench.

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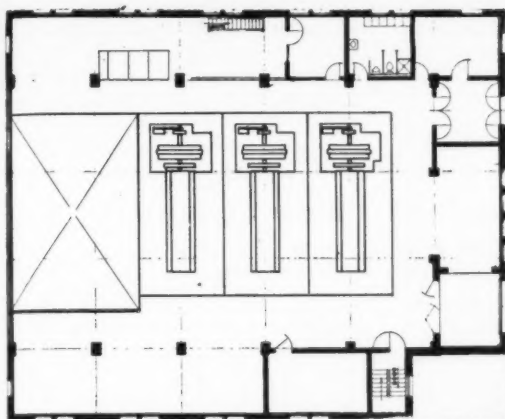
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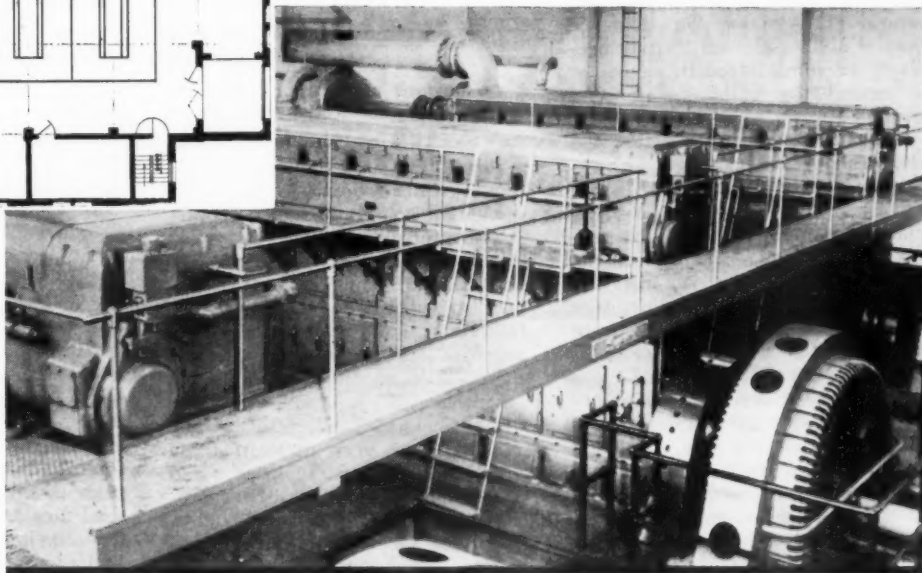
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● FLOOR PLAN of Petoskey's power plant building is shown at the left. Below is an interior view of the new 3000-KW diesel generating plant to supplement hydro and purchased power supplies.



# DIESEL ENGINES

## Solve Power Shortage

FOR the first time in more than 20 years Petoskey, Mich., has enough power to supply its rapidly increasing electric power requirements. For 50 years Petoskey has been extracting as much power as possible from the Bear River which flows through the city and empties into Little Traverse Bay. Though production of hydro power totals 2 million kwh annually, this is only one-fourth of Petoskey's needs.

After studying different types of power plants, the City Council, Mayor John Perry and City Manager Howard H. Kramer recommended diesel power to the voters. Ground was broken Nov. 11, 1947, for a new \$570,000 plant with three 1440-hp supercharged Superior diesels driving General Electric generators capable of delivering a rated total of 3000 kw. Each of these three engines develops more power than the city's three hydro units combined under full water head.

Petoskey has had an interesting history of municipal ownership and

operation of power plants. Its first municipal power was supplied by a steam plant which was used for many years. Later water rights were purchased and hydro power generated. Increasing electric demands required additional installations and finally the purchase of power from the Michigan Public Service Co. However, a power shortage still existed during much of the year.

### Basis of Plant Design

The decision to build a new diesel plant was based upon carefully estimated costs of power from various sources. These indicated that the most economical operation could be achieved by adding a municipal diesel power plant to the existing hydro-electric units. The latter are still expected to supply at least one-fourth of the power used by Petoskey's 2500 customers, based on 1948 consumption of nearly 8,400,000 kwh. Normal peak load is 2000 to 2100 kw. Highest power ever drawn

by the city was 2225 kw. during December, 1948. The new diesel plant can supply this power with two of its three engines.

The new power plant, engineered by Burns & McDonnell Engineering Company, Kansas City, Mo., is considered one of the most modern diesel stations in the United States. Contractor for the building was Peterson and Westberg, Cadillac, Mich. The R. V. Leary Co., Des Moines, Iowa, was in charge of the diesel engine installation and all mechanical work. Clement Electric Company, Grand Rapids, Mich., had the electrical contract.

The first engine was operating last August, before the building was finished, in order to meet the resort season peak demand. All engines were ready for full operation in October. The building, which is 77 by 94 ft., was designed around the equipment and, since it is located in a residential district, is of face brick and cinder block construction with clear-view glass blocks as permanently sealed windows. These provide adequate light and in addition have a heat insulating value in winter so that heating is accomplished entirely by the diesels, either directly or by piping engine jacket cooling water to unit heaters near the ceiling and service



entrance. Ventilation is provided by a mechanical system. Silencers on both exhaust and intake air pipes keep plant operation quiet.

Future increases in power requirements have been provided for by a sub-base for a fourth engine within the building and by constructing the rear end of the building of 2 by 12-ft. insulated steel wall panels. These can be removed readily and re-erected if it is necessary to admit a fourth engine or to extend the building for other units.

Mechanical piping installation was also designed to permit future expansion. Termination with gate valves and blind flanges in all piping common to more than one unit permit easy extension when additional generating capacity is installed. The service entrance, loading dock and shop are located at the front of the plant so as not to disrupt or interfere with future expansion.

The three Superior diesels are equipped with turbo superchargers of the Elliott Buchi type which are driven by the engine exhaust and turn centrifugal blowers that supply all combustion air under pressure. Turbo-supercharger operation is fully automatic at all speeds and loads. The lubricating oil system is of the force feed, dry sump type with a single pump. Lubricating oil flows by gravity from the engine sump to a separate lower level sump tank where it is discharged under pressure by the built-in pump through an edge type strainer, then through coolers and to the lubricating oil header on the engine. Oil purifiers used with each engine in a by-pass circuit clean the oil continuously.

Fuel oil is obtained from Michigan oil fields by either tank car or motor transport. Four 25,600-gallon tanks which are buried outside the building hold a two-months supply of oil. Oil from these tanks is pumped by fuel oil transfer pumps through strainers to the 250-gallon day tanks. Floats in these tanks automatically control transfer pump operation. The fuel oil is taken from the day tanks.

Engine jacket water is zeolite softened water from city lines. It is cooled by heat exchange with raw cooling water brought from the flume of one of the hydro plants. This water also cools lubricating oil by heat exchange and returns to the river by gravity. If the flume becomes clogged or the water freezes, a stand-by pump draws water from the river. The various piping systems are distinguished by

a color system: blue for raw water, gray for jacket water, brown for fuel oil, orange for lubricating oil, yellow for starting air, and black for electrical conduit.

Switchgear includes panels for each distribution circuit, the power

house lighting panel, three diesel generating unit panels, incoming panels from the hydro plants, a totalizing panel for total outgoing load, and a swinging synchronizing panel for use when diesel units are paralleled with the hydro plants.

## Protecting Vital Public Records

J. R. DONOGHUE

Ass't Prof. of Political Science, University of Wisconsin

*An abstract of a paper before the League of Wisconsin Municipalities.*

A SYSTEM of classifying records will help to distinguish between those which deserve maximum protection and those which require lesser protection. Such a system might list records as (1) indispensable; (2) important; (3) useful; and (4) useless. Some records may fall under two categories, but for purposes of protection, the higher classification should govern.

Indispensable records are those without which operation would be impossible or very difficult; those which cannot be replaced; and which, in general, establish or protect property or individual rights. Important records are those essential to orderly operation and replaceable with difficulty. Useful records are unimportant except to simplify the daily work. Useless records are what most offices have the most of.

The criteria of essentiality and replaceability are most useful in attempting the work of classification. Primarily, it must be remembered that classification is not static; therefore periodical reviews are necessary. A standard operating procedure is desirable, and even if this is rudimentary and rule-of-thumb in type, it will be helpful. The basic factors in classification will always be importance in operation and replaceability. Each office will generally face an individual problem, which will depend on the kind of work it does. The unreplaceable papers in the engineer's office will be of a different type than those in the clerk's office.

### Methods of Protection

One method is duplication. In its more usual form this is the storage of a duplicate record elsewhere than where the original is housed. The duplicate may be either a properly authenticated transcript or a photographic reproduction. This affords a definite measure of protection but it is not entirely satisfactory unless one of the copies is adequately protected.

Duplication is generally feasible only for large organizations. This is particularly true where photographic reproduction is involved. The small city or village usually must content itself with providing as adequate protection as it can within very limited means.

Another method is through the use of various kinds of "protective containers." Safe deposit vaults have an almost perfect record, particularly when located above ground level. File rooms are generally larger than the vaults and are normally less fire resistive. Safes provide considerable protection, but safes made prior to 1917 are obsolete. Ordinary steel files do not provide much protection; insulated files provide a limited protection that may run up to two hours. Their principal advantage is that they do not add to the amount of combustible material. Wood and cardboard containers are suitable only for records which you would want to dispose of anyway.

A third method of protection involves the day-to-day handling of records. Records that belong in a safe or vault should not be left out at night. It is a temptation, of course, to keep ready to hand those records with which one constantly works.

Authorities generally recommend that some plan should be prepared to handle vital records in case of a sudden fire during the day. Actually, the best plan may be to carry some records out of the building. It may thus be a good idea to know beforehand which records you want to protect in this way.

Sometimes vital records may have to leave the office and while they are gone the protection accorded them may not be as exacting as that which they get while in your own custody. Insofar as irreplaceable records are concerned, you should probably insist that duplicate copies be prepared. As regards replaceable documents, it is good practice to insist that the borrower place a cash deposit sufficient to pay the cost of replacement if the document should be lost.



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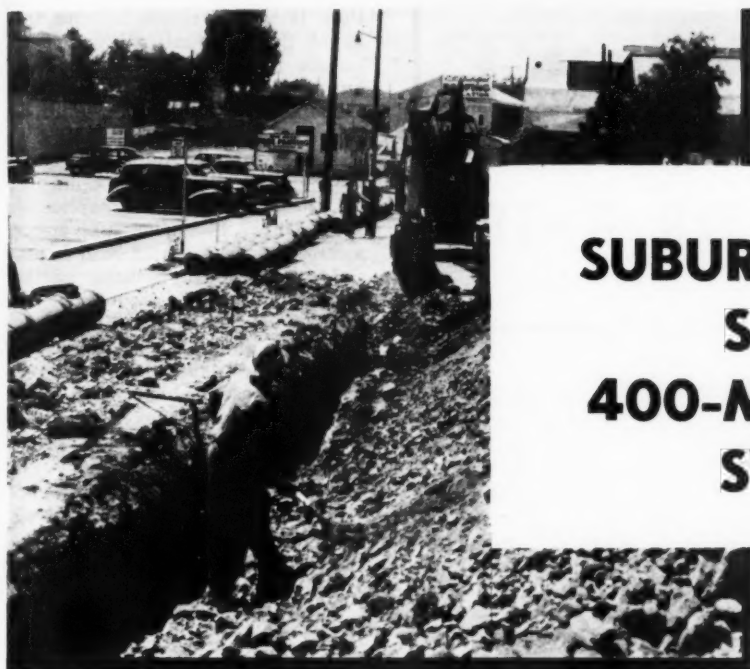
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● **TRENCH** is cut through hard sandstone with a Northwest backhoe. Depth of cut is 12 feet. Trench will carry 15-inch vitrified clay main sewer serving Walnut Creek.

## SUBURBAN AREA STARTS 400-MILE SEWER SYSTEM

**T**HE largest sewerage project of its kind in the state is under construction in Contra Costa Co., Calif., where a sewer system is being constructed to serve a 31,000-acre suburban area lying about 25 miles northeast of San Francisco. The population in this area has been growing rapidly; the current increase is now estimated at 650 per month; and the population is expected to increase ten-fold in the next 20 years.

Up to the present, 143 miles of sewers have been laid or are under construction. This system will serve about 5,000 of the 31,000 total acreage. Eventually, it is expected that 400 miles of sewers will be required.

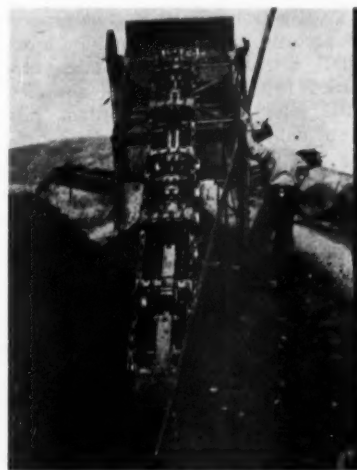
Because of the nature of the community and the extent of the area requiring sewerage facilities, it was decided to form a sanitary district, backed by the county and incorporated in its own right. It was therefore created as a political subdivision about three years ago. As organized, the district is responsible for sanitary and storm sewers, sewage treatment and garbage collection and disposal. To date, the program has been limited to sanitary sewers. The district includes the incorporated communities of Walnut Creek, Lafayette and Pacheco, and the unincorporated communities of Orinda, Moraga, Canyon, Sarnap, Pleasant Hill and Glenside. With the exception of a section of Walnut Creek, the entire area has had to depend previously on septic tanks.

The costs for constructing the collecting sewers are borne by the contractors, until reimbursed by the property owners. The District is in no way responsible for any payments of this kind. On completion of construction, the District's Engineers determine the costs of the work, following which hearings are held before the Board of the Sanitary District to confirm assessments or levies against property owners for the work done. Contractors then receive a list of property owners and the amounts of assessments, along with warrants made out to the contractors as authority to demand payment. If the owners do not wish to pay cash, the contractor is given a bond covering the warrant, which he may retain or sell as he wishes. These bonds, which carry 6% interest, constitute a first lien on the property.

The costs of constructing the trunk sewers and the sewage treatment works are financed from general obligation bonds voted by the District. Interest rates on these bonds run from 2.5% to 3%, and the bonds mature in a maximum of 30 years. The original bond issue was for \$2,300,000; it is expected that by the end of 1950, as much as \$5,300,000 may be required. The sewage treatment plant, which cost about \$665,000, is nearly ready to begin operation. This is of the activated sludge type, and it is intended to utilize the sludge as a basis for fertilizer.

Minimum depth of sewers is 5 ft.; maximum depth is about 27 ft.; and the average about 8 ft. On much of the work, vitrified clay pipe was used. One spectacular job was a 1400-ft. tunnel through the hill between Orinda and Lafayette. Four shorter tunnels were also driven to avoid passing around intermittent saw-tooth ridges. To expedite laying of the pipe in the tunnels, continuous rails were placed on which sections of the pipe were drawn into place with tractors. The rails also served to insure precise alinement of the pipe.

Twelve contracts have been let on this work to: Stolte, Inc.; MacDonald, Young & Nelson; A. T. Bennett Constr. Co.; Manuel Smith; Stanley Koller; Martin Bros.; Stockton Constr. Co.; Downer Corp.; and Associated Electrical & Mechanical Co.



● **Parsons trencher** makes 3½-ft. cut for 6-in. vitrified clay sewer.

# WHY INCREASE WATER RATES

**R. H. HARMESON**

**E**XPERIENCE with eighty small water supplies in the State of Illinois has led to the conviction that inefficiency of operation, non-existent records or inept methods of record keeping are, in many instances, taking from the municipalities sorely needed revenues; and thus are tending to cause increases in water rates. Recent papers have attempted to analyze increases in water works operation costs and to establish reasonable rate increases to cover such costs. It may be that privately owned supplies, which are operated primarily for the purpose of providing stockholders with a profit, can easily demonstrate the justification of rate increases through the medium of accurate records of equipment efficiencies, operation reports, and expenditures; however, it is notable that 663 of the public water supplies of Illinois are municipally owned, and of this number the majority is represented by relatively small towns which do not maintain high standards of record keeping.

## **Where Records Are Lacking**

To illustrate the fact that few or no records are maintained in most small towns, data have been obtained from 44 of the 60 supplies with which intimate contact has been maintained by the author during the past two years. All of these are municipal supplies. These data have been grouped according to source of supply and degree of treatment in order that some basis for comparison of efficiency of operation and distribution, rate structures, per capita demands, operating costs, and revenues may be determined.

In group I are the supplies obtained from drift wells and distributed without treatment. There are 23 supplies in this group, only one of which meters the pumpage. Connected population ranges from

50 to 5,327. In 8 of the 23, consumer meterage is 100%; in 3 it is between 90% and 100%; and 3 do not meter at all. In 17 of the 23, 100% of the population is claimed to be served, and in 2 others 99%. Consumption varies from 11.2 to 129 gpcd. Water consumption in the 11 communities having over 90% consumer meterage averaged 49 gpcd; and in the 3 communities not having any meters it was 47 gpcd. None reported making water line measurements, yield drawdown, etc. None reported having a systematic metering program. In regard to diversion of water income, 3 stated there was such diversion and 4 that there was not.

In group II are the supplies derived from rock wells and distributed without treatment. There are 13 supplies in the group, none of which meters pumpage. In 11 of the 13, 100% of the population is claimed to be served, and this population ranges from 259 to 3,689. In 4 of the 13, consumer meterage is 100%, and consumption averages 82 gpcd; one does not meter at all. None reported making water level or yield-drawdown measurements; none reported any systematic meter program; and none reported diversion of water revenues.

In group III are the supplies operating iron removal plants. There are 9 supplies in this group, ranging from 505 to 2,367 consumers. Of the 9, four meter pumpage, but only 2 have 100% consumer meterage; one of these reports a consumption of 296 gpcd and the other 18.2 gpcd.

These data reveal a wide range of variations in such items as connected population, daily pumpage, and per capita consumption. The total daily pumpage, which is basic to any cost computation, is merely estimated by 39 of the 44 operators. It is not an injustice to state that a number of these operators lack sufficient experience to justify their estimates. The same can be said of the figures for connected popula-

tion. It is interesting to note that 29 of the 44 municipalities report service to 100% of the population; but this is not borne out by facts. Calculated per capita consumptions (computed on the basis of daily estimated or metered pumpage) range from 11.2 gallons per capita per day to 296 gallons per capita per day. Only 14 have universally metered services by which it is possible to account for a major portion of the daily water production. But without the pumpage being metered also, it is impossible to determine leakage and the numerous other potential bases which often mean the difference between profitable and unprofitable operation. Few of the supplies studied have any fair basis upon which to compute per capita costs, revenues, and rate structures. For instance, the five supplies having metered pumps reported an average consumption of 112.0 gpcd; the 38 communities estimating pumpage, reported average consumption of 50 gpcd.

## **What Are Pump and Motor Efficiencies?**

It is common practice for operators of these small water supplies to accept the rated capacity of pumps and motors as the capacity at which equipment will continue to operate over a considerable length of time. Although it is generally recognized that efficiency will decrease with use, few attempts are made to determine the exact loss or to institute remedial measures. Of the 44 supplies studied, 11 have determined the overall efficiency of pumps and motors within the last five years.

Inefficiency of operating personnel contributes a fair share to the increase of operating costs. This can be stated without detracting from the diligence and integrity of the operators. It is a condemnation of municipalities and municipal officials for the common practice of saddling the water works operator with street repairs, police duty, and sewage treatment plant operation, in addition to the seemingly incidental operation of the water supply. Individuals who can perform industriously and efficiently under the burden of innumerable responsibilities and without the incentive of a lucrative salary are exceedingly rare in any field.

## **Where the Water Money Goes**

Some of the municipalities involved place water revenues in the general fund from which it goes to help support the many functions of

# OPEN REFUSE FEEDS THIS

# Disease Carrier!



Protection from Disease Carriers Is a Major Advantage of the Dempster-Dumpster System of Bulk Rubbish Collection



Rats and flies feeding on open refuse are a health menace no progressive city can endure. That's why, in more and more cities, the sanitary Dempster-Dumpster system of bulk rubbish collection is being installed. Many depositories, which are actually large detachable containers, are placed at convenient locations in business districts, housing sections, apartments and schools, in fact, everywhere that the volume of rubbish would constitute a major sanitation problem if left uncovered. Once the rubbish is placed inside and the convenient door closed, no rats or flies can contaminate it . . . no wind can scatter it.

Another great advantage of the Dempster-Dumpster System is the simple, low-cost manner in which the rubbish is collected. The Dempster-Dumpster Truck Hoisting Unit makes scheduled rounds, picks up each full container in turn, hauls it, dumps it and returns the empty to its original location. Shown at left are the three simple steps in handling a container. Top, truck hoisting unit prepares to pick up loaded container. Center, container in carrying position. Bottom, container is automatically dumped. One man, the driver, handles the entire operation from hydraulic controls in the cab. Help your city to cleaner, more efficient bulk rubbish collection by writing today for complete information.

## DEMPSTER DUMPSTER

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**DEMPSTER BROTHERS, Inc.**  
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the municipality. Although the majority of the communities claim to serve 100% of the population, as previously stated, this is largely conjectural. In those cases where a surplus of water revenue, contributed by a part of the populace, is used to the advantage of the entire populace, it may be said that the water user is being penalized to the advantage of his non-consuming neighbor. Aside from that, it seems unfair to divert water revenue to general funds when such money might better be set aside to care for depreciation, provide improvements, and to furnish a reserve against future replacements and extensions.

### Look at These Before Increasing Rates

In any case where consideration is being given to an increase in the rate structure, a careful appraisal of the following factors would appear to be in order:

1. *Total Daily Pumpage*—This item is essential to the accurate computation of operating expense, power cost, unaccounted-for-water, and per capita consumption. The metering of all pumpage would aid materially in collecting such data.

2. *Total Daily Consumption*—Whereas total daily consumption can be estimated on the basis of metered daily pumpage, a more accurate account of consumption, demand, and leakage can be obtained if services are also universally metered. The proponents of increased water rates may say that such a requirement will result in a further increase in the cost of water, however, experience has indicated that properly installed and operated meters soon pay for themselves.

3. *Efficiency of Equipment*—The efficiency of pumps and motors should be investigated before any contemplated rate increase is made. The efficiencies may be expected to drop, due to use and to the inability to obtain repairs or replacements during the recent war years. In well supplies, periodic water level readings and yield-drawdown characteristics should be recorded since a well is more or less an integral part of the pump and motor structure. These data are also useful in estimating the expected life of existing plants and as a basis for the design of future installations.

4. *Fair employment of Water Works Personnel*—The ability of many competent operators is often impaired by the various duties which they are required to per-

form. Although the occupation is not especially remunerative, according to existing wage scales for skilled and common labor, many water works employees would have greater incentive under their present salaries provided their efforts could be confined wholly to water plant operation.

5. *Reasonable Accounting Methods*—If the responsible authorities do not maintain accurate records of revenue, costs, and expenditures, no consumer is assured that his water rate is reasonable, whether that rate is to be increased or not.

From the foregoing material, it may be concluded that many small public water supplies before raising rates should review their methods of operation; their policies in regard to the employment of water revenue; and the status of their equipment. In some cases, evidence indicates, remedial action, together with the use of surplus water revenue for no purpose other than reserve for replacements, future expansion, and increased employee incentive could well result in advantages which would alleviate or remove the need for increases in rates.

### How to Install a Suction Pump

W. F. Schaphorst, M. E.  
Newark, N. J.

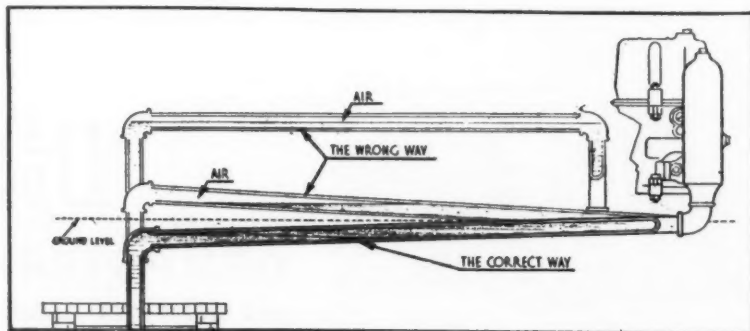
Is your pump giving trouble? Maybe it is "air bound" as indicated in this sketch. Usually a small amount of air is present in all water; hence if any point in the suction piping (from well to pump) is higher than the level of the pump, the air will automatically separate from the water and will form a pocket in the high point of the line. The air will gradually collect there until it reaches such a volume that it merely compresses and expands with the pump strokes. There will then, of course, be no flow of water whatever. The pump will be "air bound."

This sketch shows the proper method of piping. The suction line

should be arranged with a gradual slope from the pump to the water supply. The slope should be at least one inch to each fifteen feet. Just above the correct way two wrong ways are indicated by means of lighter lines. If for any reason you are forced to use such a method of piping as marked "wrong" be sure to use a tee and a plug instead of the first elbow. You can then release the accumulated air when necessary. Careful attention to this diagram will save time and trouble. The suction line must be air tight. Care must be taken to lead or paint all joints to guard against leaks. If the suction line leaks, the pump will give trouble. An "almost horizontal" suction line is practical up to 1000 feet, but care must be taken to slope it gradually from the pump to the well. The longer the suction line, the greater the strain on the suction valves in the pump. On suction lines over 100 ft. in length it is essential to use an extra vacuum chamber to relieve the suction valves and also to guard against water hammer.

### Reducing Payroll Preparation Costs

A contractor has accomplished a time saving of 35%, representing an annual saving of \$2,185, through the installation of an up-to-date payroll system. This system should be easily applicable to street, highway and water departments. Normally, 13 to 15 weekly entries have to be made for each employee. In the case of the contractor mentioned above, there were 275 employees, requiring 4,150 separate entries per week, for which three people were required for 15 hours, plus 10 hours for posting earnings records. The Todd Co., Rochester, N. Y., developed a system by which the entries are made with a single writing of a special machine. The entire job is now handled by two people working 18 hours weekly each. Complete records are available every day.





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# WHAT'S TO BE SAID ON THE QUESTION OF DURABILITY

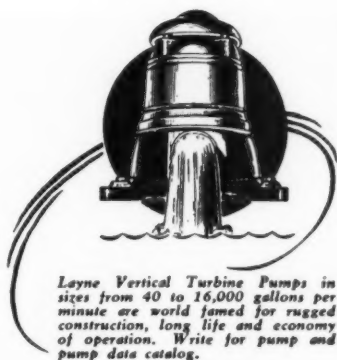
*That's Where Quality  
Scores A Hit!*

Durability in a well water system is something that doesn't just happen.

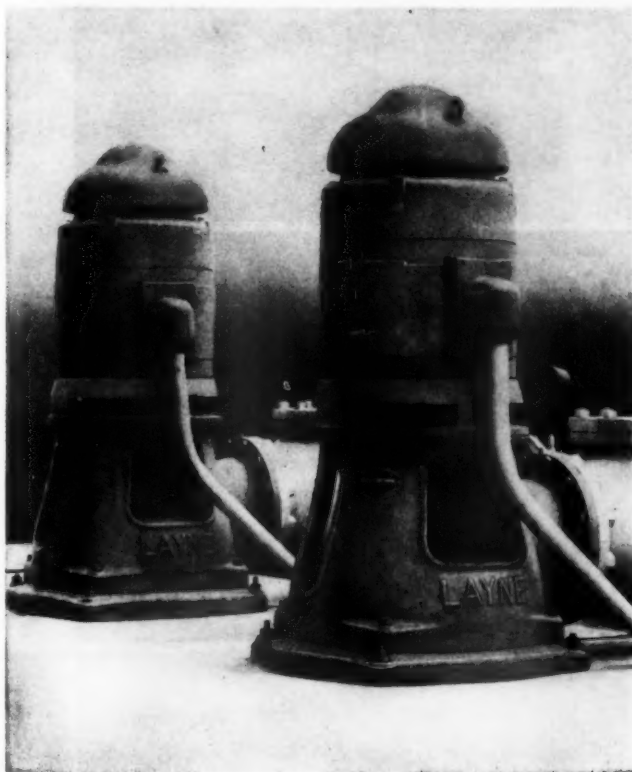
It has to be built-in from carefully made plans, extra good materials and a lot of know how.

With nearly seventy years of experience in designing, building, testing, installing, servicing—and repairing well water systems, it seems quite logical that Layne might know something about what it takes to create durability.

Layne does! And that's a very emphatic statement backed up by actual operating



Layne Vertical Turbine Pumps in sizes from 40 to 16,000 gallons per minute are world famed for rugged construction, long life and economy of operation. Write for pump and pump data catalog.



facts on hundred of systems, many of which according to their tremendous production records should have been worn out years ago, but are still humming along at remarkably high efficiency.

Absolute perfection in any kind of mechanical equipment has never been achieved, but Layne can assure every buyer that their systems are definitely unmatched in long life durability,—a fact that probably accounts for their extraordinarily wide use.

For further information, catalogs, bulletins etc. address

LAYNE & BOWLER, INC.

General Offices

MEMPHIS 8, TENN.

# LAYNE

## WELL WATER SYSTEMS

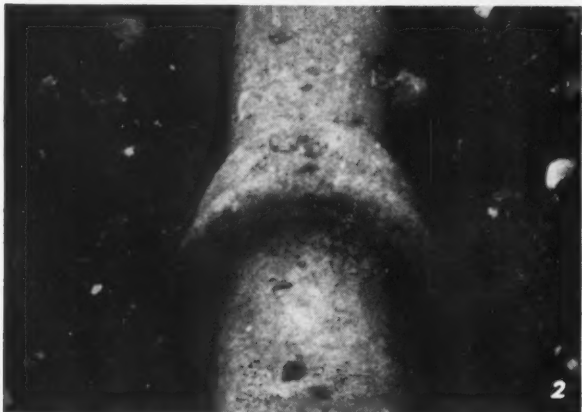
**AFFILIATED COMPANIES**—Layne-Arkansas Co., Stuttgart, Ark.  
★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee,

Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ Layne-Texas Co., Houston, Tex. ★ Layne-Western Co., Kansas City, Mo. ★ Layne Minnesota Co., Minneapolis, Minn. ★ International Water Corp., Pittsburgh, Pa. ★ International Water Supply Ltd., London, Ont. ★ Layne-Hispano Americana, S.A., Mexico, D F

When writing, we will appreciate your mentioning PUBLIC WORKS



(1) This 101-year-old cast iron water main is serving Frederick, Maryland.



(2) Still in use after 118 years of service in the water supply system of St. Louis, Mo.

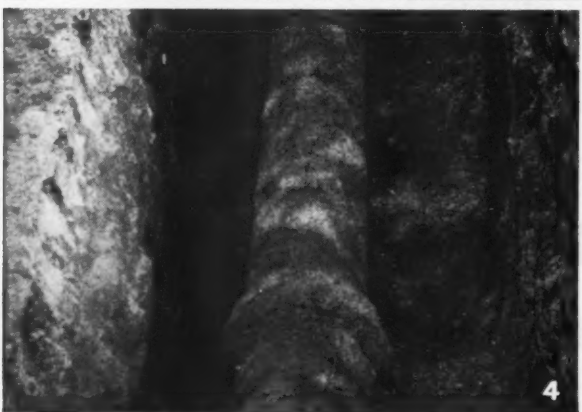
(3) This water main, installed 117 years ago, is still serving Richmond, Va.

(4) Lancaster, Pa. laid this cast iron water main 105 years ago. It is still serving.

(5) One of several cast iron water mains that have been serving New York City for more than a century.

(6) America's oldest cast iron water main, now in its 132nd year of service in Philadelphia.

(7) This cast iron water main has been serving Boston for 120 years.



## Going strong in their 2<sup>nd</sup> Century

About 30 of the older American cities have cast iron water or gas mains in service which were laid from 100 to 132 years ago. Most of these mains, on or after their 100th Anniversary, have been uncovered, inspected and photographed for the record. Seven of them—all water mains, are shown in this advertisement.

While it is well known that cast iron water mains in England, France and Germany have service records that approach three centuries, we, who make cast iron pipe, nevertheless get a thrill out of looking down into the trench at an uncovered section of a main that has been in service for 100 years—and so, we are told, do water works and gas engineers.

When one considers the radical changes which have occurred in a century in vehicular traffic, and the vast development of underground construction for the many utility services, the fact that these mains are now in their second century of service is all the more remarkable.



**CAST IRON PIPE**  
SERVES FOR CENTURIES

Cast Iron Pipe Research Assn., T. F. Wolfe, Engr., Peoples Gas Bldg., Chicago 3.

*When writing, we will appreciate your mentioning PUBLIC WORKS*

## REFUSE COLLECTION AND DISPOSAL PRACTICES IN MARYLAND

*A summary of a survey and report  
by Edgar G. Heyl, Senior Assistant  
Sanitary Engineer, Maryland De-  
partment of Health*

**D**ESIGNED to obtain data on current methods of refuse collection and disposal, and their costs, a questionnaire was sent to 114 municipalities in Maryland. Of these 88, or 77.1%, were returned. The information covered communities ranging in size from 100 population to 960,000. In addition, personal visits were made to 48 of the 88 communities in order to verify data, get additional information or inspect operations.

### Preparation of Refuse for Collection

Only 33, or 37½%, of the communities reporting stated that their garbage equipment was water tight, and the accuracy of some of these statements appears to be questionable. Therefore, there is every reason to believe that in many places there is leakage of garbage juices onto the street. This condition emphasizes the desirability of water-tight vehicles; or, lacking these, of draining the garbage before placing it in the container. Also, tonnage of refuse may be materially reduced by draining, and in these places where the unfortunate practice of burning on dumps is followed, better combustion is obtained with a low moisture content.

Wrapping of garbage was reported by only 12 communities, but represented 52% of the state's population. Wrapping in paper is considered advantageous because it results in a cleaner can; there is less corrosion of the can; and less trouble with freezing. Less than one-third of the communities require separation of the refuse.

Nearly half of the communities reporting—41 of 88—have specifications for garbage cans and 18 have specifications for rubbish containers. The only uniform requirements for garbage cans are that they be of metal and have tight-fitting covers. Many require galvanized metal; sizes vary from 10 to 30 gallons. Most of the requirements are vague, as "closed can," "covered metal container," and "regular garbage can." Requirements for rubbish containers vary from "not more than a 30-lb. can" to "not more than a 100-lb.

can." Some places permit wooden or cardboard boxes.

Municipal collection systems for all refuse are operated by 30 communities, or 34% of those reporting, with 14 others providing municipal collection for rubbish and/or ashes, and, in one case, garbage only. Contract collection of all refuse is provided in 16 communities, with 6 others using contract collection for everything but ashes and 3 contracting for rubbish removal only. Private collection is used by 9 communities.

Of the 30 communities having municipal collection, 17 collect garbage twice a week; 2 collect three times a week and 2 four times a week. One collects 6 times a week and another, a resort town, 7 times a week; five collect once a week and one collects twice a month. Some communities collect less frequently in the winter.

Where contract collection for all wastes is employed, garbage is collected twice a week in eight places, once a week in seven, and twice a month in one. In the nine communities having private contract collection, garbage, ashes and rubbish are collected twice a week in four and once a week in five.

### Collection Vehicles

As nearly as can be estimated there are 250 refuse collection units in use in the state, of which 133 are modern, closed packer-type bodies. Of these 90 are in Baltimore and 14 in the Washington Suburban Sanitary District, leaving only 29 in the remainder of the state. A considerable number of the towns using open trucks state that covering is provided for them but "it is not unreasonable to view these statements with some skepticism."

Where open trucks are used, the sides are built up with boards to give greater capacity. This results in damage to cans which are tossed down from the trucks, and also increases the labor of lifting the filled cans. When hydraulic-lift or load-packer trucks are used, there is much less damage to the containers. In Montgomery County, collectors are equipped with a 5-ft. square canvas onto which the cans are dumped. The 7½ oz. canvas initially used lasted only 5 days; 12-oz. canvas lasts about two weeks. Regular washing and drying is necessary.

Of the 88 communities reporting, 3 use sanitary fill or a variation; 11 use incineration; 17 feed garbage to hogs; 44 use open dumps; the other 13 either have no disposal method or made no report. Baltimore has the only real sanitary fill, but when the present area is exhausted incineration will be employed. The sanitary fill operation has been "conducted with a reasonable degree of success although the area around the fill has not been entirely free from odors."

Baltimore also has a 600-ton incinerator which takes care of about half its refuse. In 1947, this unit handled 147,089 tons of refuse, of which 39.6% was garbage and 60.4% rubbish.

### Refuse Disposal Methods

In regard to hog-feeding, it is the general practice to "dump the garbage on the ground in the area in which the hogs are penned. The hogs feed as they will and the uneaten garbage and feces remain on the ground. . . . Plowing is either never done, or only once or twice a year. . . . Only one feeding platform was seen and it was so badly corroded it could not be used. . . . All the farms are in very bad shape and probably the worst one is used by Frostburg. Here a pen about 75 ft. square holds about 25 hogs. The garbage is dumped in this area and the hogs wallow in the resultant muck composed of decaying, uneaten garbage, feces and mud. . . . In the summertime large numbers of flies are attracted and . . . the odor is both nauseating and strong. . . .

"Open dumps constitute the largest single garbage disposal method . . . and consequently the largest single health hazard. . . . Only one dump (at Bel Air) seen could be considered as being properly handled. . . . Refuse is dumped by city employees and burned immediately. . . . The dump is sprayed with DDT . . . and poisoned to kill rats. . . . The rest of the open dumps in use are in very bad condition and the reasons are not hard to find. Little or no supervision . . . municipal authorities avoid them . . . know little about their actual condition and care less. . . . The average open dump has a strong, unpleasant odor which has the unfortunate ability of traveling long distances."

"Of the 44 places using open dumps for garbage, 10 have them in the city limits and 14 within one mile. . . . The dump at Texas caught fire . . . and it required nearly two weeks to put it out." The Brunswick



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dump has a "high fly and rat population." At Cumberland, "several dozen pigs and a flock of chickens feed on the dump; eight or ten dogs roam the dump and are the only rat control measure. The fly population is high and the dump has an offensive odor. . . ." The Easton dump "burns spontaneously" and there are "large numbers of flies and rats." At Havre de Grace, "the quantity of flies seen was staggering," "the rat population is very high" and "the odor . . . in cool weather is vile and in hot weather must be unbearable."

The above examples are characteristic and indicate a situation badly in need of change. The worst part of the picture is that only 4 of the 44 communities indicated any desire to improve conditions.

"What has been said of the dumps receiving garbage is also true of strictly rubbish dumps. No particular effort is made to maintain them properly or is any thought given to the selection of suitable sites. Many are located within corporate limits. They are fire hazards, cause smoke and odor nuisances and are usually rat harborages. In all of those seen, unauthorized garbage gets into the dump with the result that flies breed

rapidly, rats have a source of food and odors are produced. . . . Consequently it can be safely said that all refuse dumps are breeding grounds for disease carrying insects and animals."

#### North Dakota Prohibits Parking Meters

A new North Dakota state law prohibits the use of parking meters, even of those already installed. Probably Fargo is not the only city which thus finds itself compelled to remove from its streets hundreds of meters now in service, at considerable expense and loss. Fargo is offering for sale 818 meters installed less than 18 months ago, and 35 new ones still in their original boxes.

#### Lighting Snow Removal Equipment

A standard uniform method of lighting snow removal equipment was approved by the American Association of State Highway Officials on June 25 of this year. Details are as follows:

Identification lights should be provided on all snow and ice control equipment. These lights should

be flashing; should be blue in color, with a minimum lens diameter of 6 inches; should have a minimum light intensity of 21 to 32 candlepower; and should be visible from all directions. These identification lights should be mounted on the cab.

Clearance lights should include one light on the left side of the cab, adjustable to the extreme width of the plowing equipment. A clearance light should also be placed on the right side of the cab when plowing wings are not used. When wings are used, flood lights should be provided to illuminate the plowing wing. Clearance lights should show amber from the front and red from the rear; the minimum dimension of the light should be 2 ins., and the light should be of ordinary tail light intensity.

Other lights may be required. Additional operating lights may be located on top of the cab or at other locations to illuminate plowing, spreading of abrasives, or other equipment. Truck headlights should be raised so as to clear operating equipment, and auxiliary headlights used if necessary to provide ample lighting.

A Special Invitation to

YOU

to Attend the 55th Annual

## PUBLIC WORKS CONGRESS and Equipment Show

FROM September 18th to 21st, 1949, in the Municipal Auditorium in Kansas City, Mo., nearly a thousand public works engineers and officials will meet to share ideas and experiences at the 55th annual Public Works Congress and Equipment Show.

This is a cordial invitation for you to come too.

#### Catch Up on Latest Practices

You will like the practical aspect of the technical sessions. You will find out why many come year after year especially for the renowned round-table discussions. Sessions cover latest practices in street construction and layout, traffic safety, refuse collection and disposal, street cleaning and snow removal and motorized equipment.

For further details write today to

AMERICAN PUBLIC WORKS ASSOCIATION

1313 EAST 60th STREET, CHICAGO 37, ILL.

Technical Sessions, Round Table Discussions  
and Equipment Clinic

SEPT. 18th to 21st, 1949, at  
KANSAS CITY, MO.

There will be discussions of personnel problems, public relations for public works departments, planning and other problems.

The equipment clinic is a big feature. This includes displays and demonstrations of latest equipment. You can see many pieces of the latest equipment in operation.

#### For Everyone Engaged in Public Work

If you are a city engineer, commissioner of public works, county, state or federal engineer, consultant, contractor, or otherwise employed in public works, this Public Works Congress is planned especially for you. There will be entertainment for both you and your wife if you can bring her along. So plan now to come to Kansas City in September.

*Announcing...* A COMPLETELY NEW L

**ALLIS-CHALMERS**

**MODEL**

**D**

**Weight: 8,500 lbs.**

**Brake H.P. : 34.7**

**Engineered from the ground up  
—to bring you BIG grader design  
and performance advantages**

*Big in  
Performance*

- **TANDEM DRIVE** — maximum traction at all times, smoother riding.
- **PROPER WEIGHT DISTRIBUTION** — handles bigger loads . . . front-end stability.
- **"ROLL-AWAY" MOLDBOARD** — less power required to move more material at faster speeds.
- **HIGH THROAT CLEARANCE** — rolls larger loads without interference.

- **RIGHT WORKING SPEEDS** — four forward, 2.40 to 18.61 M.P.H.; reverse, 2.37 M.P.H.

- **TUBULAR FRAME AND DRAWBAR** — strong, shock absorbing, better visibility, more working clearance.

*Big in  
Economy*

- **RUGGED POWER** — famous Allis-Chalmers gasoline tractor engine; easy to service, economical to operate — fuel tank holds day's supply.
- **SIMPLIFIED SERVICING** — operating adjustments easily reached, quickly made.
- **ALL-WELD CONSTRUCTION** — strong, long life, stands up under tough service.

**ALLIS-CHALMERS**  
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

# NEW LOW-COST MOTOR GRADER



2.40 to

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POWER  
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tractor  
service,  
supply.

stments

g life,

*Big in  
Operating Ease*

- **FULL VISIBILITY** — no obstructions, operator can see full blade while sitting or standing.

Upper half of cab  
quickly lifted off  
or replaced.

- **GREATER OPERATOR COMFORT**—roomy platform, comfortable seat, easy to handle.

- **HYDRAULIC BLADE LIFT** — fast, positive, trouble-free; only two control levers.

- **HANDY CONTROLS** — blade angle set from platform; throttle, shift lever, starter, conveniently located next to seat.



Scarifier location provides  
extra down pressure and  
allows controlled steering.

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for*

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## SPECIAL ATTACHMENTS

- Hydraulically Controlled Scarifier
- Hydraulic Loader
- All-View Cab
- Snowplow
- Various Other Accessories

# CLOSE TO 30,000 CU. YDS. OF CONCRETE BEING FORMED *with*

## ATLAS SPEED FORMS

...FOR OKLAHOMA CITY'S  
BIG, NEW SEWAGE DIS-  
POSAL PLANT



FROM "CIVIL ENGINEERING", MAY '49

Completed wall of 186  
ft. dia. secondary filter.  
Atlas Speed Forms  
shown placed for pour-  
ing of inspection well.

Here is a tough concrete job made easy by modern, but simple, form equipment. Earl W. Baker & Co., general contractors, wanted a form that would cut costs ... and at the same time do its job. They chose reliable Atlas Speed Forms to carry the load ...

No matter what type of job you have, whether it be sewer, bridge, building, dam, etc., Atlas Speed Forms will give you lower costs. Our Staff of engineers, having the cumulative experiences of hundreds of other contractors with problems exactly like yours, are ready to help. Consult us on your next form problem ... there's no obligation.

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- COLUMNS • DAMS
- MANHOLES • TANKS
- SEWERS • BRIDGES
- TUNNELS



**IF YOU WRITE**  
we will be happy to  
send you our new 2-  
color, 40-page manual,  
"How to Use Atlas Speed  
Forms." Explanations are  
given on how to cut concrete  
costs on all types of jobs.

## IRVINGTON FORM & TANK CORP.

IRVINGTON 27

NEW YORK

### Minnesota's State-Owned Gravel

The Commissioner of Highways of Minnesota reported in 1948 that the State owns 561 active gravel pits in 81 counties, estimated to contain 15,166,213 cu. yd., which had been purchased at an average cost of 2.77¢ per cu. yd. During the previous fiscal year the department had used 1,814,067 cu. yd. from these pits and also 3,729,638 cu. yd. from leased pits. There were only six counties in which it owned no pits.

### Saving Money With Better Maintenance Equipment

A HIGHWAY department that kept accurate cost records on each of its ten bituminous materials plants, which varied in type and age, found that six old-type plants produced 61,800 tons of patch material at a cost of \$10.19 per ton. The four modern plants produced similar material at \$8.15 per ton. If the six old plants were replaced with modern-type plants, the annual saving on the production of 61,800 tons at \$1.44 per ton would be \$89,000.

The above data, and the information that follows, are from a discussion by H. A. Radzikowski, Chief of the Division of Maintenance, Public Roads Administration, at the Savannah meeting of the ARBA.

The cost of loading spoil from ditches has been greatly reduced by the use of front end loaders. In one state, where cost records on such work were kept, the cost of doing the work by hand was 70¢ per cu. yd. The loader performed the same work under similar conditions for 12¢ per yard.

Radiotelephone has proved useful as a communications medium. One state maintenance engineer reports that 20% more snow removal work can be performed with the same equipment through the better control and more efficient use possible through radio control.

The metals used in maintenance and construction equipment may be improved. A state highway department which orders as much as 500 tons of cutting blades at one time has found that a vanadium alloy, though costing more initially, is economical because the useful life is greatly lengthened. A contractor uses drill bits of a special composition which costs 10 times as much but gives 100 times the service.

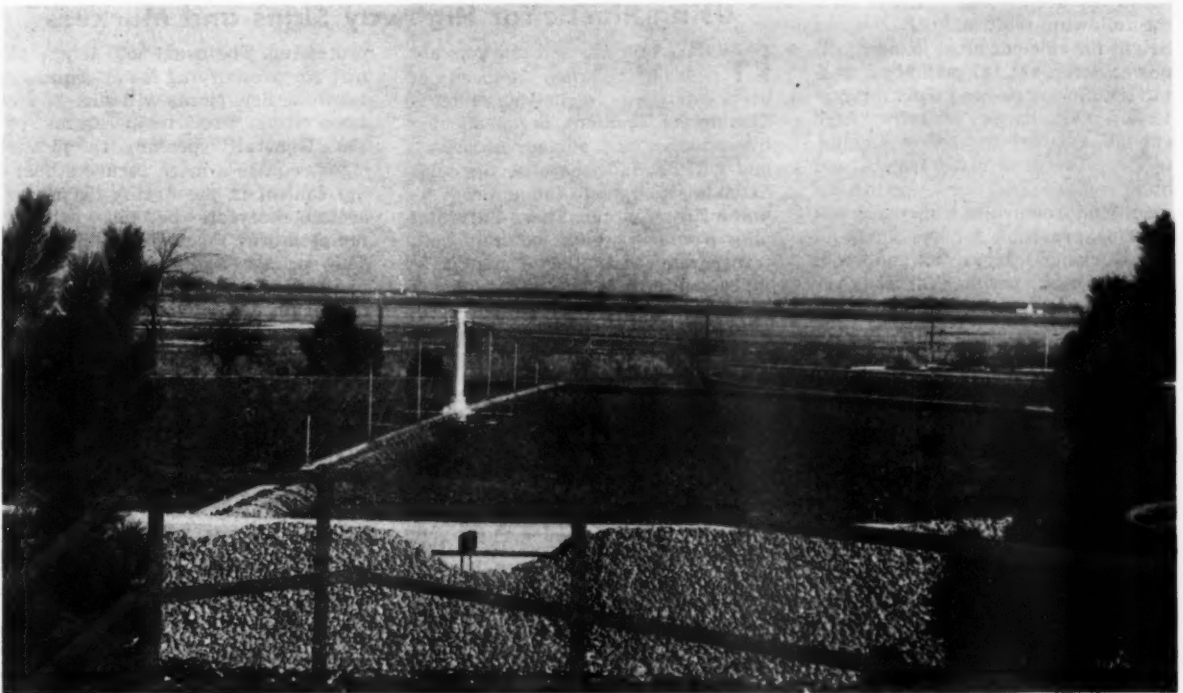
These are a few of money-saving possibilities cited by Mr. Radzikowski; he also outlined some desirable improvements in maintenance equipment and facilities.



## TODAY'S FILTER PLANTS

use

*vitrified clay filter bottom blocks*



Designed by: A. H. Smith Company, Toledo, Ohio  
Contractor: Bever and Morris

### 118 ft. WALKER Distributors At Large Tomato Canning Center

#### Important Advantages:

**RESIST ACIDS  
WON'T CLOG  
EASY TO LAY  
PROVED BY USE  
LAST A LIFETIME**



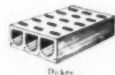
Patented



Patented



Bowerston



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Patented



Patented

**B**OWLING GREEN, OHIO, is a large tomato canning center. In addition to its domestic sewage, the plant handles a tremendous tomato canning load and turns out an effluent of excellent results. Each of the WALKER Distributors at Bowling Green handles 1,000 gpm of flow during the tomato canning season.

Hats off to Walker Process Equipment Inc.! And hats off to the *Vitrified Clay Filter Bottom Blocks* at Bowling Green too. Built for life-time, trouble-free service, they are scientifically designed to insure best operating results in any type of filter. Play safe on your next filter job—specify *Vitrified Clay Filter Bottom Blocks*. Get more details today from any member of this Institute.

## TRICKLING FILTER FLOOR INSTITUTE

AYER-McCAREL-REAGAN CLAY CO. NATIONAL FIREPROOFING CORP. BOWERSTON SHALE CO. POMONA TERRA-COTTA CO. TEXAS VITRIFIED PIPE CO. W.S. DICKEY CLAY MFG. CO.  
Brazil, Ind. Pittsburgh 12, Pa. Bowerston, Ohio Pomona, N. C. Mineral Wells, Tex. Kansas City 6, Mo.

When writing, we will appreciate your mentioning PUBLIC WORKS

Highway maintenance trucks cannot be compared, in efficiency, to those employed by telephone companies for their construction and maintenance work. Taking into consideration the normal uses for a highway maintenance truck it would seem that such a truck should have the following features: (1) Low bed height for efficient hand loading; (2) power dumping; (3) possibly a double bottom for heating patching material; (4) lights mounted high enough, if used for snow plowing, to clear the plows; (5) frames and bumpers designed for easy attachment and removal of snow plows; and (6) provision for the safety of the workmen carried to and from the job, such, perhaps, as removable sides and rear cab windows that will open.

Improvements in highway garage layouts and tools are possible. Heavy parts should always be stored on the first floor unless suitable power elevators are provided; windows should be arranged for the fullest possible lighting; floors should be high enough and so constructed as to be dry and to drain readily; door widths and heights should be ample for all equipment; a good office

should be provided; and noisy operations should be located away from the office area.

Quoting Rex Whitten, Maintenance Engineer of Missouri, he says: Maintenance men think that main-

tenance equipment should be designed for highway maintenance, and should not be . . . equipment that has received a little remodeling to make it slightly adaptable to highway maintenance work.

## Using Plastic for Highway Signs and Markers

**H**IGHWAY signs and markers are now being manufactured of acetate butyrate, a plastic, which is flexible and resilient, is not affected by scratches and surface abrasions, and will not fade, because the color extends throughout the entire volume of the marker. These butyrates offer a wide range of color in both transparent and opaque materials. Since sunlight is the worst enemy of pigments, whether in paint or in plastics, special ultraviolet inhibitors have been added to delay the effect of the ultraviolet rays. With the use of specialized paints, legends can be applied that become a part of the plastic itself, and hence are permanent. Butyrates also provide a new stability with reference to weather and vandal resistance.

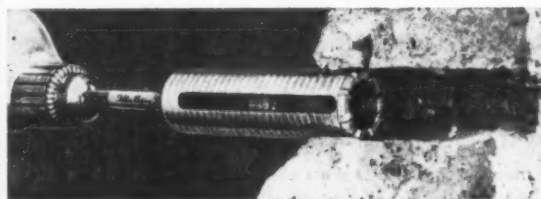
When using plastic signs of this type, it is necessary for highway engineers to revamp their ideas on

processing. The usual 300° temperature for oven drying is not required, for these new paints will cure in the same time with temperatures of 190°. Generally speaking, the plastic signs require a more accurate heating control in the drying ovens for acetate butyrate becomes soft at temperatures much exceeding 200°. The primary purpose of baking paints is to drive off the volatile matter in the vehicle. One of the volatiles used in the paint for these plastic signs actually attacks the solvent, thereby fusing the paint into the sign before it is driven off by the oven heat.

This plastic material lends itself readily to spraying, silk screening, roller coating and the transfer processes.

In some areas it has been customary to clean signs with steam. While steam does not normally affect plas-

## DRILL CONCRETE 2 to 6 INCHES PER MINUTE!



### WITH THE TILDEN ROTARY KONKRETE

(driven by ordinary electric drill)

Up to 70% more efficient than pointed or solid drills. Leaves straighter, cleaner holes. Tilden Rotary Konkrete Kore Drill bits are available in sizes from 1/4" to 4" diameter. Quotations on sizes from 4" to 8" will be made upon request.

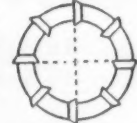


Ordinary pointed or solid drill (left) must drill full area of hole. Point of drill acts as pivot and retards cutting. Only one double cutter gives slow action. Slow-moving 1/2" center travels at only 13% of most efficient cutting speed.

TILDEN KONKRETE KORE DRILL (right) drills much smaller area of hole. Has no point to retard cutting. All drills have from 3 to 24 cutters depending on size of drill which travel at best cutting speed, give fast, efficient action. Write for catalog with complete details on this revolutionary concrete drill bit.

DISTRIBUTORS: Inquiries welcomed.

**TILDEN TOOL MFG. CO.**



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PASADENA 3, CALIF.

**SAVE MONEY & TIME** With the UNIVERSAL CONTROLLED-FLO TRAFFIC LINE PAINT STRIPPER with long lasting ALL METAL Paint Spreader.

**NO BRUSHES - ENGINE - HOSE COMPRESSOR - PUMP - JETS**

Combination gravity feed and all-metal, shoe-type spreader.

Use any standard zone or striping paint. Indoors or out, on any road surface. ROLL-ON paint on easily, quickly. Spreader offset affords clear view of line all times. Finger tip control of flow.

Standard model: All welded steel chassis and 9 gal. tank with funnel bottom to use all the paint. Cast aluminum alloy wheels, all metal spreader.

In widths from 2" to 8" spreaders interchangeable but not adjustable. Wt. 60 lbs., 47" long, 24" wide, 38" high. All parts standardized and interchangeable for replacement.

Free literature on request

With one spreader	Rubber-tired ball bearing wheels \$15 extra.	<b>\$115</b>
Model B, 5-gallon tank capacity	Spreaders: 2" to 4" width \$20; 4" to 8" width \$25.	<b>\$90</b>

**UNIVERSAL MARINE & MFG. CORP., 137 Alexander St., Yonkers 2, N. Y.**

## Order Now . . . Handbook of Small Sewage Treatment Plants

**T**O help small communities get the most modern and usefully long-lived plants possible the Editors of PUBLIC WORKS and outstanding authorities in the field prepared a series of articles on Small Treatment Plants. These seven articles, first published in PUBLIC WORKS, cover volume of flow, primary settling, sludge digestion and disposal, activated sludge and small trickling filter details and design. The comments of a number of

State Sanitary Engineers show typical State Board of Health requirements and recommendations.

**Contains Design Data** Plant layouts, tables and design details especially adapted to small plants are included together with money saving suggestions.

**Order Now** A copy of this booklet will be mailed postpaid promptly on receipt of \$1. Money back if not fully satisfied.

tic signs, they are more easily cleaned with detergents applied with brushes, followed by rinsing. When plastic signs become dirty after long periods of exposure, they can be revitalized by wire brushing.

Butyrate is easily reflectorized by any of the recognized methods. Scotchlite, Prismo, decals or reflector buttons may be used. As a general rule, reflector elements which have a cellulose acetate base, or those which are soluble in ketone esters make the most durable bonds to butyrate signs. When reflective coatings are removed from a plastic sign, they merely expose the non-corrosive butyrate, which is of the same color as the remainder of the sign. Scratches and abrasions are virtually invisible.

Weathering tests have been conducted on acetate butyrate materials for as long as six years and under very severe conditions; tests have been made in Florida, in Arizona and in the cold-weather states. Weatherometer tests by laboratories have shown little or no change in the plastic materials under accelerated tests 24 hours a day, for 6 months and more. They are also highly resistant to vandalism. Shotgun pellets merely bounce off the sign, leaving only a slight transfer of lead from the pellet impact. A 22-caliber rifle slug leaves a hole slightly smaller than the diameter of the bullet. There is no other damage and the hole can be mended, if desired, by applying new material under heat, causing it to bond to the old.

Because acetate butyrate is a thermo plastic material, and most of the signs weigh a great deal more than the average thermoplastic product, special manufacturing methods are necessary to insure a strain-free and warp-proof sign. This involves rapid heating, the compaction of the raw granules into the finished form, and rapid chilling.

These plastic signs, which are manufactured by the Columbia Sign and Signal Corp., 10030 Lorain Avenue, Cleveland 11, O., are made in the standard sizes and shapes indicated in the sign manual published by the Public Roads Administration. The signs are molded with the front face flat so that blanks may be stocked and legends added and altered as needed. This adds to standardization and eliminates the need for large stock piles to meet the needs for various purposes.

For engineering data on these plastic signs and markers, circle No. 8-1 on the coupon on page 77.

**SUPERIOR IN EVERY WAY**  
**DESIGNED TO PROVIDE ALL PRACTICAL**  
**SHAPES QUICKLY AND EASILY**

**Heltzel**  
**BUILDS IT BETTER**

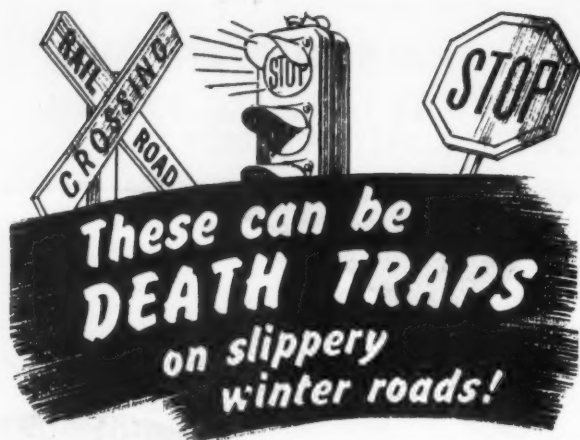
**DOWEL JOINT CURB FORMS**  
**STRAIGHT, RIGID AND FLEXIBLE RADIUS CURB AND GUTTER FORMS**  
**SIDEWALK FORMS**

**SHAPES,**  
**STANDARD**  
**OR SPECIAL,**  
**ARE EASILY MADE**  
**FROM HELTZEL STEEL FORMS**

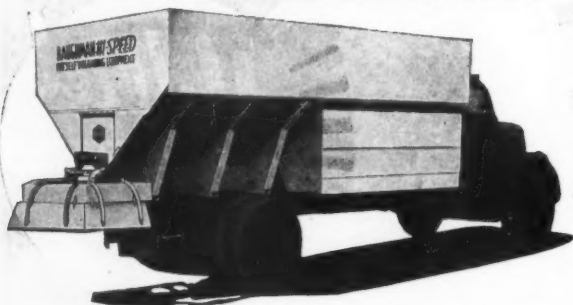
**HELTZEL** STEEL FORM & IRON CO.  
WARREN, OHIO • U. S. A.

When you need special information—consult the READERS' SERVICE DEPT. on pages 77-81





## Get Quick Effective Ice Control With the BAUGHMAN Spreader



**FAST ACTION** is needed when roads are icy. The Baughman spreads 8 to 30 ft. widths at 25 mph. One man with a Baughman does the job of several crews on ordinary truck bodies. Cuts manpower costs . . . lowers equipment requirements.

**ALL-WEATHER OPERATION.** Built-in exhaust heater keeps material and conveyor chain in working condition in lowest temperatures. Ruggedly built with less weight . . . more rust resistance. Arc-welded throughout.



### CAB CONTROL

Vacuum clutch control in cab starts and stops drag chain and distributor. Prevents waste—skid-proofs hills and curves to desired lengths . . . spot-spreads at junctions.

### ALL ONE-MAN CONTROL



### CONCENTRATED SPREAD

Adjustable baffle plates limit width of spread . . . stop waste . . . prevent damage to passing cars and injury to pedestrians. Completely regulated volume. Uniform spreads.

**LOW PRICE . . . QUICK DELIVERY**  
Write for Full Information



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181 Shipman Road Jerseyville, Ill.

"There is a Baughman Distributor Near You"

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# Public Works ENGINEERING DATA

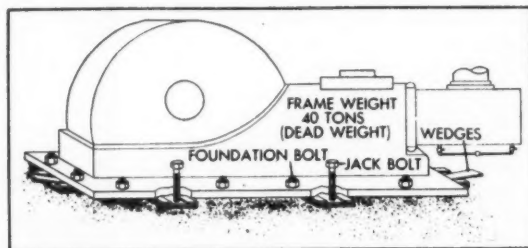
## Diatomaceous Filter Eases Water Shortage

Drought conditions recently caused a critical water shortage at Gasport, N. Y., and it was necessary to supplement the regular supply with water from a nearby creek. A diatomaceous filter was flown from the Proportioneers' factory in Providence, R. I., and installed. This filter processed up to 90,000 gpd. The filtered water was treated with hypochlorite.

## Grouting for Heavy Equipment

When heavy stationary equipment is being installed the proper procedure for grouting between the frame and the precast concrete base is of considerable importance.

In an example proposed by Leon A. Watts, Manager, Service and Erection Department, Allis-Chalmers Mfg. Co., it is assumed that a large rotating machine weighing 40 tons is to be supported on grout above a precast concrete foundation. This precast base, which is provided with bosses to receive 10 foundation bolts, is roughened and wetted on top. Grading and leveling is accomplished with jack bolts and steel wedges placed as shown in the accompanying illus-



tration. To insure against a shift from external vibration the frame is secured by tightening the nuts on all foundation bolts as evenly as possible, applying a load of about two tons on each. The grade and level must be checked at this point, for the machine weighs 40 tons, and the strain on the foundation bolts adds another 20 tons. This entire load is supported on the six  $\frac{1}{4}$  inch square area contacts of the jack bolts and wedges, making a concentrated load of about 10 tons on each.

Forms are now readied for grouting, and a mixture of about six gallons of water per sack of cement is spaded and agitated in place to provide a sound, high compression strength grout. After placing, the grout is allowed to cure for about a week. With gravity grouting under normal conditions about 75% contact is achieved, with no upward pressure against the machine frame. The load will still be concentrated on the bolts and wedges.



Although the machine may be operated satisfactorily for a time with the bolts and wedges taking the load (even though the grout is in place), the load vibration will eventually peen the six points of concentrated load, forming dents in the load area. These dents may permit motion beyond the elastic stretch of the foundation bolts, allowing the entire frame to move freely with the vibration of the unit. Therefore, for best results the wedges and jack bolts should be withdrawn after the grout has set for a week. Then, after foundation bolts have been checked for tightness, the bed plate will be held firmly against the grout with no chance to work free, and the load will be distributed at 16 or 17 psi over a large area.

### DDT in Paint Kills Insects

Ever since DDT was developed, it has been hoped that it could be mixed with paint, so that decoration and long-time insect control could be accomplished at the same time. A flat wall paint has been developed which, on cage tests, showed 100% kill of female flies after 17 weeks exposure; and homes in Hartsville, S. C., where the paint has been in use for 2½ years, report that it still gives good control of flies and mosquitoes. Similar laboratory results were obtained with a gloss enamel with which 8% by weight of DDT was incorporated. This gloss paint has been used in homes for nearly two years and is still reported lethal. The enamel paints appear to develop toxicity more slowly than the flat paint. This is believed to be due to the fact that the contact of the flies with the paint is necessary to cause release of DDT crystals.

The data in this item are taken from a paper by W. K. Lewis, Jr., B. R. Whaley, W. S. Adams, and W. A. Biggs, Jr., of Sonoco Products Co., before the South Carolina Academy of Science.

### Accident Hazards in the Construction Industry

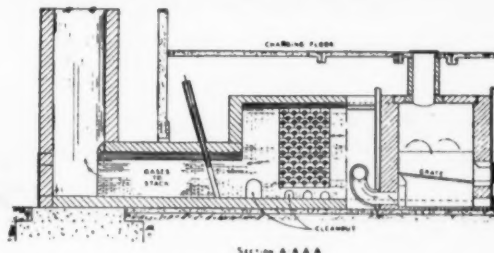
According to the National Safety Council, the accident frequency rate for general building construction is 31.99 per thousand, and the severity rate 2.09 per thousand. In steel erection, corresponding rates were 59.95 and 12.59, as compared to rates for all industries of 12.95 and 1.27. In 1947, the construction industry was 34th out of 40 in severity rating. About 150,000 men were injured; 2,400 were killed; and 4,600 others suffered some form of permanent physical impairment.

This means that one man out of every 16 suffered an injury and three men out of every 1,000 were killed or suffered permanent disability. These figures compare very well with some of our major battles. They emphasize the need for everyone engaged in this hazardous work of construction to become accident-conscious; and they point out the necessity for sound safety policies in construction and maintenance by every city, county and state.

### Equipment Owned by N. J. Highway Department

Equipment owned by the New Jersey Highway Department totals 2,429 pieces, including 603 snow plows, 446 trucks, 208 spreaders, 122 air tools, 20 air compressors, 93 tar kettles, 74 graders, 55 pumps, 43 concrete mixers, 16 rollers, 12 loaders and 8 mud-jacks. The main garage is located near Trenton, but there are 8 other service stations and garages located at convenient points throughout the state.

## "FITCH" RECUPERATORS FOR INCINERATORS



**A**N INCINERATOR necessity is a good recuperator. "Fitch" Recuperators combine Thermal Conductivity, Great Strength and Accessibility.

Write for Bulletin No. 11  
"RECUPERATORS FOR INCINERATORS"

**FITCH RECUPERATOR CO.**  
PLAINFIELD NEW JERSEY

### Newly Improved OK CHAMPION POWER SEWER CLEANER



### DON'T LOSE Sewer Capacity

Clear your sewer lines regularly. Keep up full carrying capacity and you save money—in lower maintenance cost and avoiding costly backwash. Order OK Champion Power Sewer Cleaner equipment and your men remove roots, dirt and other obstructions from any storm or sanitary sewer in ONE operation. All men work above street level.

OK Champion cleaners are regularly clearing sewers all over the world. New improvements make them better than ever. Send for literature.

CHAMPION CORPORATION  
Hammond, Indiana

### GET FULL FACTS NOW!

CHAMPION CORPORATION, 4752 Sheffield Ave., Hammond, Ind. Please send information on how the Improved OK Champion Power Sewer Cleaner cuts sewer cleaning costs.

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# PUBLIC WORKS DIGESTS

Highways and Airports page 50

Sewerage and Refuse page 57

Water Supply page 64

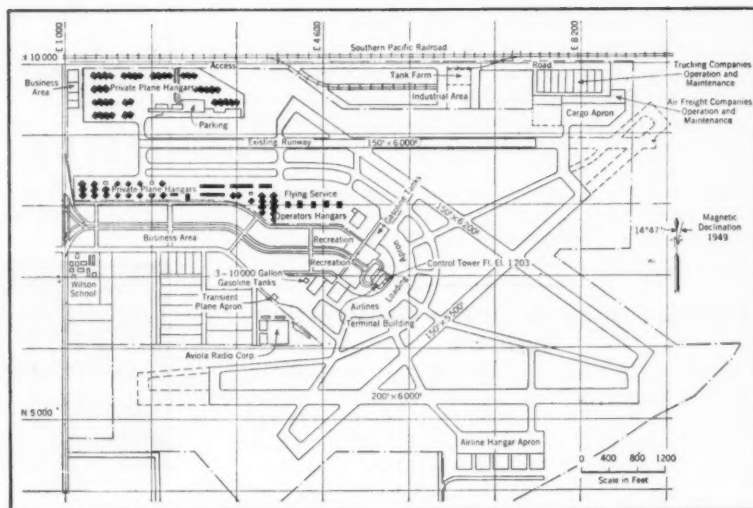
● This section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

## THE HIGHWAY AND AIRPORT DIGEST

### Reconstructing the Phoenix, Arizona, Airport

The Phoenix Municipal Sky Harbor Airport is being expanded according to a plan that combines facilities for commercial planes with those for private planes and features for rendering it self-supporting. An area along the adjacent railroad has been set aside for industrial use. Provision is made for commercial air transport, private flying, and flying-service operators. Ten loading positions are provided for commercial air lines and six for transient planes. There are two large repair hangars, five flying-service operators' hangars and five for commercial air lines; a parking lot for 400 cars; a storage garage and service station; fire station, and several buildings for general maintenance and operation. Large gasoline tanks are available for use by several companies. A revenue of \$350,000 a year is expected from sale of gasoline, field use charges, rental of land for business uses, and other sources.

Drainage is only rarely a serious problem; a maximum hourly rainfall of 1.08" occurs only once in 5 yr. The soil is composed of gravel, sand, silt and some clay. The groundwater depth is over 10 ft. One runway, equipped for instrument landings, its taxiways and aprons are designed for 120,000 lb. plane loads. This pavement is composed of a 6" aggregate subbase, 10" aggregate base, and 3" asphaltic concrete wearing surface. At the ends of runways and for warm-up pads and station apron, 14-11-14" unreinforced concrete is used. The other runways are designed for 74,000 lb. plane loads, with 3" aggregate



Courtesy Civil Engineering

### ● PLAN for extension of Phoenix's Sky Harbor airport.

gate subbase, 9" aggregate base course, and 2" asphaltic concrete wearing surface. Aprons for aircraft-service operators and for transient planes are designed for 28,000 lb. plane loads and will be of 6" unreinforced concrete. Aprons for private planes and all roadway pavements in the airport will be 6" aggregate base topped with 2" asphaltic concrete.

Walter Johannessen — "Phoenix Reconstructs Its Sky Harbor Airport"; *Civil Engineering*, July.

### Motor Graders For Highway Work

There are over 23,000 motor graders in use by state, county and local highway departments, 90% more than

in 1936. In 1948, 57% of the graders were of the lighter weight. The larger graders are particularly adaptable for road mixing of bituminous materials and laying oil mats. They are good at blading work, since the blade will stay in a set position. They are also adapted to grading, but some maintenance men find them too expensive, and that the lighter one-man grader, which costs only half as much, is suitable where the material is not too heavy. Several report that the lighter machines are not suitable for bituminous surfacing work.

There are many operations on which the tow grader is the most effective tool, as for ditch cleaning. There is a definite need for a reduction in the many models and sizes

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It's true that material and labor costs are higher, but they need not undermine your sewer budget. You can make substantial savings on material costs in larger sizes by using ARMCO Sewer Pipe. Even better, you can save up to 25 per cent of labor costs. This is how it is done . . .

ARMCO Corrugated Metal Pipe is light in weight, easy to haul and handle, using only ropes and plank skids. Long lengths mean fewer joints—less assembly—faster installation. No special foundations are required and no time is lost in curing. Unskilled labor quickly makes tight joints with simple band couplers. On extra large sewers sturdy, prefabricated MULTI-PLATE Sections are delivered to the site ready for speedy, low-cost installation.

You will also find other advantages in ARMCO Sewer Structures. Install them under railways and highways without worry of breakage or loading failures. There is a size and type for every purpose.

ARMCO PAVED-INVERT Pipe combats erosion. ASBESTOS-BONDED Pipe provides all the durability you will ever need. Where headroom is limited ARMCO PIPE-ARCH saves time and labor.

An ARMCO Engineer will be glad to demonstrate how you can save time and money on your specific problems. Ask him about ARMCO Sewer Structures before figuring that next job. Armco Drainage & Metal Products, Inc., 855 Curtis Street, Middletown, Ohio. Export: The Armco International Corp.



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of blading equipment and for standardization of sizes between manufacturers. This would reduce the manufacturing, acquisition and maintenance costs and would facilitate the selection of equipment.

H. A. Radzikowski—"Power Equipment Trends in Highway Maintenance"; *Roads and Streets*, June.

#### Traffic Planning For Small Communities

Methods for gathering traffic data needed for traffic planning by communities of 30,000 or less have not received sufficient consideration. The methods can be much simpler than those generally recommended for large cities. These latter include 5 separate surveys—motor vehicle volume count, cordon count, origin-destination count, major route congestion survey, and street and off-street parking survey. The author believes it possible for a small community to obtain the necessary data with only the first type of survey, if this be carefully prepared and executed. He describes in detail how to organize such a count, recruit the personnel, select the traffic count stations, prepare the forms, brief the personnel and make the count.

William S. Bonner—"A Simple Method for Small Community Basic Traffic Planning"; *PUBLIC WORKS*, July.

#### Equipment of Kansas Highway Dept.

Kansas State Highway Dept., in improving and maintaining its 10,000 mi. of highways, uses more than 2,000 pieces of equipment. These include 741 trucks, 189 motor graders, 314 tractors, 123 bituminous distributors, 151 asphalt kettles, 366 mowers, 258 rollers, 358 snow plows; also compressors, concrete mixers, bituminous mixers, brooms, power shovels, front-end loaders, belt loaders and road magnets. Each major piece of equipment is assigned to one operator, and he is made primarily responsible for its condition.

Each of the state's 27 highway districts has its own repair shop, and each of the six divisions has a shop where the more complicated and extensive jobs are handled. Where a large group of machines is working on one project, a mechanic accompanies them to make field repairs. About one-third of all the machines pass through one shop or another each year for overhaul. Heavy equipment is checked over thoroughly

during the winter, and also is usually overhauled completely when brought to a shop for any repair. The shops have built road magnets and center-line marking buggies.

"Kansas SHC Keeps 'Em Rolling"; *Construction Methods and Equipment*, July.

#### Cincinnati's Highway Maintenance Equipment

The Cincinnati Dept. of Public Works owns several million dollars' worth of equipment distributed among 13 divisions, which include highway maintenance, water works, waste collection, fire, police, etc. Records of maintenance costs, performance and durability are kept up to date on each piece of equipment. When these show that it is uneconomical to keep any piece of equipment in service because of cost of maintenance or poor construction, it is disposed of. Some 8-ton trucks have been sold when only 8 yr. old, while some power shovels, rollers, concrete mixers and tractors are found economical after 18 to 21 yr. service.

Shop repairs and maintenance of all equipment owned by the city are made in a 425 x 120 ft. municipal garage. Part of the shop is served

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Legal advertisements for bids, plans and contract documents may be obtained from Russell and Axon, Consulting Engineers, Municipal Airport, P. O. Box 1431, Daytona Beach, Florida, upon deposit of \$35.00 for each set, \$10.00 whereof will be refunded upon returning the set in good condition within 10 days after award of the contract.

J. M. BALDWIN  
City Manager



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by an overhead gantry crane. There is a welding shop, a blacksmith shop, machine shop, stock room, tire inspection and repair shop, battery room, body shop, grease racks, motor rebuilding room, upholstery shop, and paint shop. The normal crew for the entire garage totals 72 men. Repair and maintenance of equipment starts in the field, where field-service men report any repairs needed. If the job is too big to be fixed on the spot, the equipment is hauled to the garage, using a tow truck mounted on a 20-ton 6-wheel chassis which can handle anything that rolls; mounting on the rear two large hydraulic cranes, and on the front a 40,000 lb. winch; also a 2,500-watt generator, welding equipment, oxyacetylene burning torches and an electric saw.

To determine hourly service rates, each new piece of equipment is assigned a depreciation schedule—trucks usually 8 yr., tractors 6 yr., passenger cars 5 yr. Records of equipment performance and maintenance costs are examined each May to determine what units should be replaced. In December decision is made as to what new equipment is needed for the next year. In 1948 and in 1949 the Highway Maintenance Division spent \$300,000 for equipment, which has so far filled its needs that probably only \$90,000 will be spent in 1950.

"Cities Keep 'Em Rolling, Too"; *Construction Methods and Equipment*, July.

### Lighting a Highway Bridge

A highway bridge between Salem and Beverly, Mass., is lighted by a continuous row of fluorescent lamps 500 ft. long installed as an integral part of the hand rail on one side of the bridge. An 8 ft. slimline lamp is inclosed in a metal housing with a clear glass front and a reflector in the rear; the housing being fastened to the tops of the railing posts, 5 ft. above the roadway. (Experience indicates that a height just below 4'8" would be preferable). Each lamp emits 3,200 lumens, or 400 lumens per lineal foot. The lighting is continuous and uniform for the whole length of the roadway. The low mounting height helps visibility during foggy weather.

"Experimental Lighting for Bridge Roadway"; *Better Roads*, June.

### Resurfacing Detroit's Asphalt Streets

Many of Detroit's streets are paved with 2" of sheet asphalt on 1½" binder on 8" concrete base, which

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- The Netco Catch Basin Cleaner can be mounted on any short wheel base truck having at least 8 ft. in back of cab. You can purchase unit separately and mount on your own chassis.
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was laid 20 to 35 yr. ago, and each year now some of them need to be reconditioned. Before World War II the regular plan was to reconstruct the entire pavement, or else the top and binder on the old base. Since the war four other methods have become more or less standard. Where the old surface shows little sign of base failure, it is treated with a seal coat, using high penetration asphalt or emulsified asphalt, and precoated sand. Cost in 1947 was 13¢ a sq. yd.; estimated life, 4 yr. Or a more substantial treatment consists of bond-coating the old surface with emul-

sified asphalt, followed by a  $\frac{3}{8}$ -in. sheet asphalt surface. Cost 41¢ per sq. yd.; estimated life, 8 to 10 yr.

Where there is heavy truck traffic and the base shows sign of weakness or the pavement is very rough, the treatment consists of 1" of regular sheet asphalt mixture either on 1" of fine graded binder, including bond coat, or on  $1\frac{1}{2}$ " to  $2\frac{1}{2}$ " of standard coarse-graded binder. The former cost \$1.05 per sq. yd. and had an estimated life of 15 yr.; the latter cost \$1.30 and had an estimated life of 18 to 20 yr.

In each case, the old pavement was

first conditioned by patching holes and filling cracks with sheet asphalt mixture or fine-graded asphaltic concrete, and cleaning the surface by sweeping or flushing. This cost 4¢ per sq. yd. Taking out the old pavement, including the base, and replacing with an entirely new pavement cost \$6.50 per sq. yd., and the estimated life is 20 to 30 yr. All costs given are for 1947; no work of this kind was done in 1948.

Charles J. Shattuck—"Economical Asphalt Street Maintenance"; *American City*, July.

#### Some Details of Palisades Interstate Parkway

This parkway, now under construction, for 43 miles traverses New Jersey and New York park areas west of the Hudson River. All grade crossings are eliminated by grade-separation structures. Opposing traffic lanes are separated by a landscaped center mall varying in width from 10 to 300 ft. Where possible, the separated roadways will be at different levels, to eliminate headlight glare. Mountable curbs 4" high of white concrete with vertical fluting to reflect car lights, will define the edges of the pavement. Horizontal and vertical curves will provide a minimum sight distance of 1,000 ft. Horizontal curves up to 5,000 ft. radius are banked. The pavement is 8" reinforced concrete, darkened by mixing 3% by weight of carbon black with the concrete, to reduce glare and provide a contrast with the white curbs and uncolored access drives.

Samuel Nelson—"Route to Link Eastern Park Areas"; *Better Roads*, June.

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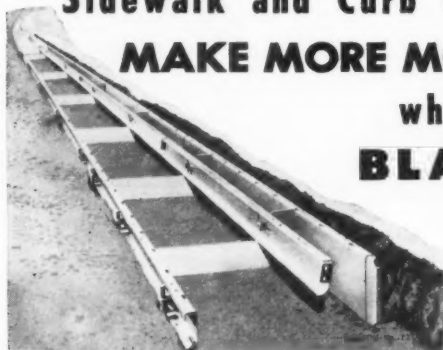
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Procurement Services Centralized. By Milton Harris, Stores Engr., Calif. Div. of H'ways. June, Pp. 22-24, 37.  
Route to Link Eastern Park Areas. By Samuel Nelson, Dep. Chf. Engr., Palisades Park Com'n. June, Pp. 25-28.  
Are Chemicals the Answers to Weeds? June, Pp. 33-34.  
Sand Drains Installed at Marsh Crossing. June, Pp. 39-40.  
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##### California Highways and Public Works

Prison Labor: Story of Highway Road Camps in California. By G. A. Tilton, Jr., Super. H'way Engr. May-June, Pp. 28-31.  
Right-of-Way Clearance in the Los Angeles Metropolitan Area. By Robert A. Spooner, Right-of-way Agent. May-June, Pp. 35-41, 47.

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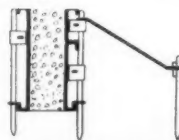
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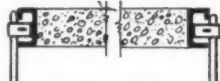
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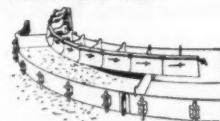
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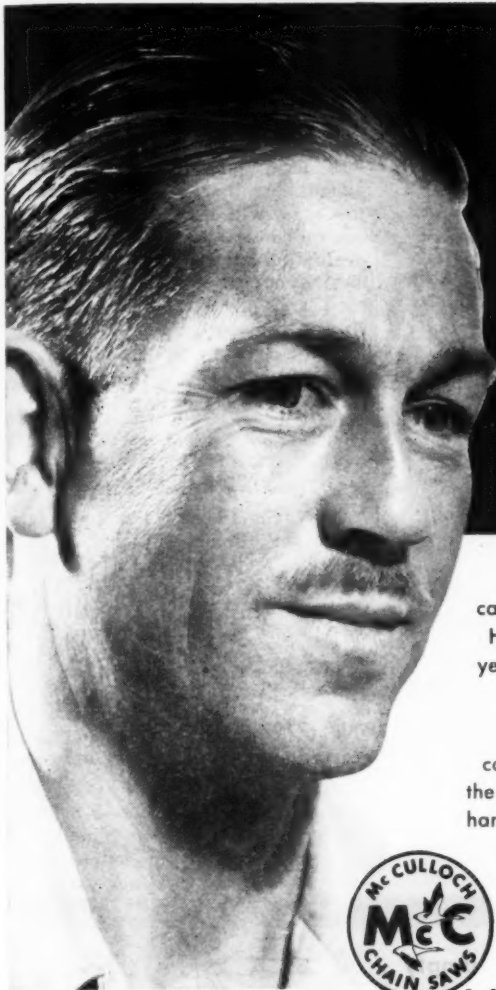
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# "Looked at all, then bought McCULLOCH"

**says Alhambra City Forester**

J. G. Stel, forester for the City of Alhambra, California, made a careful study before selecting a chain saw for the city's forestry program. He wanted a saw light enough to take up into a tree when necessary, yet with ample power to cut rapidly through big pepper trees, palms, etc.

He chose a McCulloch on the basis of demonstrated performance.

Now, after months of constant use, he and his department are completely satisfied\* they made the wisest investment. Mr. Stel estimates the McCulloch chain saw has increased the capacity of his department in handling removal and surgical work on Alhambra City trees by five times.

\*After watching the McCulloch perform on city work, Mr. Stel and five other members of his department bought one for their private use!



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Cooper and William Anderson, both of Alhambra's Parks and Recreation Dept., show how the 5-hp McCulloch operates perfectly in any position, and cuts easily through wood and knots at any angle.



### Civil Engineering

Phoenix Reconstructs Its Sky Harbor Airport. By Walter Johannessen, consult. engr. July, Pp. 21-24.

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Methods for Subgrade Treatment and Drainage. By H. A. Sullivan, Co. Engr., Traverse Co., Minn. July, P. 32.

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Resistance to Traction, Curve Compensation and Gradients. By H. Criswell, June, Pp. 206-210.  
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Some Solutions to Every-Day Traffic and Parking Problems. By Grant Mickle, Traffic Engr., Automotive Safety Found. June, Pp. 65-67, 91.  
Greater Mechanization: Highway Maintenance "Must." June, Pp. 68-70.

Power Equipment Trends in Highway Maintenance. By H. A. Radzikowski, Chf. Div. of Maint., P.R.A. June, Pp. 71-75.  
Front-End Loaders. June, Pp. 76-79.  
New Roadside Maintenance Methods. By W. J. Garmhausen, Landscape Arch., Ohio Div. of H'ways. June, Pp. 80-82.  
Bituminous Patching at 2 to 4 Miles per Day. June, Pp. 87-88.

### Engineering News-Record

Service Station Facilities for Limited-Access Highways. By Ralph L. Fisher, Engr. of Design, New Jersey H'way Dept. June 23, Pp. 52-55.

### Preventing Corrosion from Salt Used in Ice Control

Results of the use of a corrosion inhibitor with salt applied to the streets of Rochester, N. Y., during the winter of 1948-1949, have been made available. Beginning in December, 1948, 2% of the inhibitor, or 40 lbs. per ton of salt, was used, but due to the apparently good results that were obtained, the dosage was reduced to 1% in January, 1949. Though many complaints had been received from vehicle owners in previous years, practically none was received during the past winter.

Steel test panels were installed on police cars, buses, city trucks and some private cars; also, similar panels were installed on cars and trucks operating in the Southwest Section of Chicago, where salt is practically

never used. Panels were also installed in three other cities where salt was used.

At the end of the season, the test plates in Rochester showed a slightly smaller average weight loss than did those in Chicago, where no salt was used; and a markedly less weight loss than in the other three test cities where salt was used without the inhibitor. Through the final evaluation of results must be based on the appearance of the vehicles used and on the reactions of the citizens, this test indicates that such inhibitors are highly effective.

The data in this article are from Bulletin 44 of the National Aluminum Corp.

### Thawing Road Culverts

In Wayne County, Michigan, water in the ditches of paved as well as gravel roads is frequently blocked in winter because of frozen drive-way and cross-road tile, small culverts, etc. These are thawed by means of a portable boiler, the steam from which is carried through hose and a small pipe about 10 ft. long to a nozzle, which can be directed to any point desired and even pushed through the pipe or culvert.

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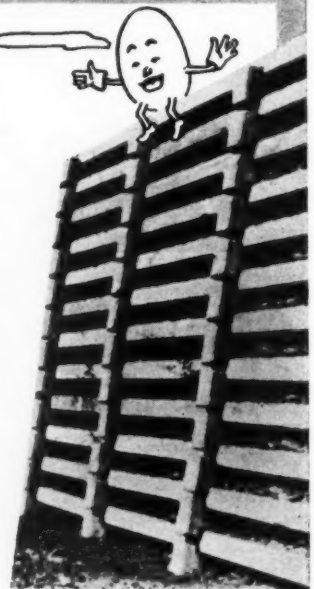
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# THE SEWERAGE and Refuse Digest

## PUBLIC WORKS DIGESTS

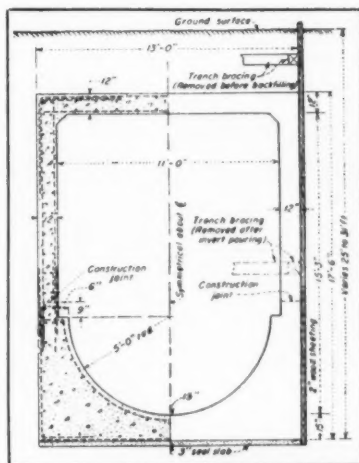
### Designing Sewer for Economical Construction

Houston, Tex., in designing a storm sewer to carry 1375 cfs and be placed 25 to 31 feet below ground, proceeded in an unusual method. It was learned that the soil was stiff clay and sand, and local contractors said open trench construction would be cheaper than tunneling, and several believed that a trenching machine cutting a maximum of 14 ft. width would provide the cheapest excavation. Accordingly the sewer was designed to be constructed in a trench sheeted, 13 ft. wide between sheeting. Allowing 12" vertical walls, reinforced, gave a sewer with 11 ft. inside diameter. The bottom was given a semicircular form. With these dimensions fixed, it was calculated that the inside height of a sewer with a flat slab roof should be 15 ft. 3". To minimize cost of form work, the semicircular invert form was made of sheet steel 50 ft. long and moved 3 days after pouring. A 6" set-back at the top of the invert afforded a bench for supporting the steel side forms, thus minimizing the cost of the form work. The contractor completed the 4475 ft. of this sewer at the rate of 40 ft. per day and a total cost of \$790,000.

"An Economical Storm Sewer"; *Engineering News-Record*, June 23.

### Stream Characteristics and Industrial Waste Pollution

The author, using the Raritan River, New Jersey, as an illustration, presents arguments for basing the limitations set for industrial wastes upon the self-purification capacity of the stream receiving them. The suggestion is offered that industry could be helped in stream pollution control by the allocation of reasonable amounts of such properties as dissolved oxygen content and acid neutralizing power of the streams, based upon comprehensive studies of the streams themselves; also, that industry's efforts would be augmented and greatly aided if the appropriate authorities were to assume actively the obligation of pro-



Courtesy Engineering News-Record

**Cross-section of economical  
Houston storm sewer.**

viding adequate dilution by maintaining a reasonable uniform flow in streams. In many streams the water is wasted during periods of high runoff, with the result that periods of low water and inadequate dilution follow.

V. L. King, R. F. Bann, R. C. Conn, R. E. Lester, J. E. Stanley and D. Tarvin—"Relation of Stream Characteristics to Disposal of Chemical Manufacturing Effluents"; *Sewage Works Journal*, May.

### Diet and Sewage Disposal

Writing of conditions in South Africa that affect sewerage and sewage treatment, E. J. Hamlin, former city engineer of Johannesburg, said that domestic sewage varies in its composition with the diet of the people contributing it. "In South Africa approximately 80% of the population are non-Europeans, who live (or exist) on a diet composed principally of carbohydrates. In a bucket removal night-soil system where the majority of people live principally on a carbohydrate diet, it is practically impossible to digest the bucket contents. During the process of digestion pH values as high as 12 are encountered

and this seems to inhibit the process of digestion. The author has seen bucket contents which have been subjected to a digestion process of 12 months and then buried, from which, two years after burial, several types of viable ova, cysts, etc. have been recovered. However, bucket contents discharged into the sewer and mixed with the sewage of European population are amenable to the digestion process and after a comparatively short period the ova found in the digestive sludge have been proved to be not viable."

E. J. Hamlin—"Sewage Disposal in South Africa"; *The Surveyor*, July 1.

### Temporary Plant For School Sewage

This plant, with Imhoff tank and trickling filter, was planned to be used for 5 years only, as it was expected that sewerage facilities would be available by that time. It was designed for 180 school children at 4,000 gal. per 8-hr. school day, 200 ppm of BOD (the maximum probably will not exceed 180 ppm). Because of the topography, the units were elevated above the ground and the sewage pumped by a duplex non-clog ejector with a capacity of 25 gpm against a 20 ft. head, into a circular Imhoff tank. The effluent flows to a circular trickling filter and then to a settling tank, and the sludge is drawn off onto a sludge bed.

The Imhoff tank, 10 ft. diameter and 14 ft. 6 in. deep, is constructed of cypress wood, with settling compartment partitions made of 1/4" Transite sheeting with an 8" slot and 6" overlap. An inlet baffle of Transite, extending 12" above and below the liquid level, was placed on 12" from the pump discharge pipe. The trickling filter is a standard rate, circular, 12 ft. diameter with 6 ft. depth of 3" stone on a vitrified filter bottom. The distributor is a Yeoman's "Water Wheel" rotary. To maintain a constant flow and keep the filter wet nights and Sundays, the settled filter effluent from the bottom of the settling tank

is recirculated to the raw sewage. The trickling filter stone is retained within 2" mesh cyclone wire fencing instead of a wall. Experience indicates that this open construction is objectionable during cold weather and because it does not permit flooding for control of Psychoda flies. Cold weather also caused formation of ice on the distributing mechanism, and the entire filter is to be enclosed before next winter. The final settling tank is made of cypress, 6 ft. in diameter and 6 ft. deep. The sludge drying bed is 18 ft. by 10 ft., with 6" of sand on 6"

of graded gravel. The filtrate is returned to the raw sewage.

Robert T. Richey and John Dolio—"Temporary Complete Sewage Treatment for a School"; PUBLIC WORKS, July.

#### Automatic Control of Raw Sewage Chlorination

Because of its location, adequate, effective odor control is an absolute requirement of the Fort Wayne sewage treatment works. This control is effected by chlorination. About half the chlorine is applied to the sewage about an hour before

it reaches the treatment plant. At the plant, at the inlet to the grit chamber, an additional amount is added, continuously adjusted to bring the chlorination to a point 30 to 35% short of an immediate residual. At the former or program station the rate of dosage is 200 lb. from 2 to 10 a.m., 1500 lb. from 10 a.m. to 5 p.m., 1200 lb. from 5 p.m. to 10 p.m. and 200 lb. from 10 p.m. to 2 a.m. The second dose is determined and applied automatically. A small stream of the chlorinated sewage is passed continuously through a potential cell and the difference of potential as measured by the cell is transmitted to the potentiometer, which is set for a millivolt reading of 70, at which reading 65-70% of the instantaneous chlorine demand is satisfied. If the reading is less or greater than 70, the potentiometer calls for more or less chlorine, which is effected through an automatic rate controller, which increases or decreases the submergence of the vacuum tube in the chlorinator. The equipment has performed satisfactorily with no headaches. The total cost of the two stations was \$15,300, or 1% of the cost of the whole plant.

Ralph A. Hoot—"Automatic Control of Raw Sewage Chlorination"; Water & Sewage Works, July.

#### Experiences at Back River Sewage Works

The sewage treatment works of Baltimore, Md., have a capacity of about 200 mgd. Improvements to modernize the plant, made since 1930, have cost \$3,859,500. These included grit chambers, which remove from 2.1 to 4.4 cu. ft. per m.g. of sewage. The volatile matter in the grit has varied from a yearly average of 37.0 to 74.6% on the dry solids basis. Incinerating the grit is being considered.

Scum from the five settling tanks flows to a sludge well through an 8" c.i. pipe, which frequently in cold weather becomes clogged with grease and is cleaned manually with sewer cleaning tools. It is planned to install a large submerged gas burner in the manhole at the upper end of this pipe line and heat the scum as it enters the pipe.

The 30 acres of trickling filters are dosed with spray nozzles and the number of these cleaned varies from 2.6 to 3.6 per m.g. of sewage treated, or from 7.1 to 9.1 per acre daily, which requires the services of 2 men for 8 hr. a day, 6 days a week. The first 12 acres were provided with 6" terra cotta distribution pipes encased in concrete, which are in

## ANOTHER FEATURE OF BUILDERS PROPELOFLO METER



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## Vitrified **CLAY PIPE**

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excellent condition after 36 yr. of service.

The major operating problem with the activated sludge units has been sludge bulking. Chlorine was tried as a remedy but was unsatisfactory. Increasing the volume of air from 1.15 cu. ft. per gal. of sewage to 4.0 cu. ft., with 12 ppm of dissolved oxygen in the mixed liquor, was unsuccessful. Some improvement was obtained by shutting off the sewage flow to the aeration tanks with continued aeration of the mixed liquor for as long as 24 hr., at the same time pumping back a

large volume of return sludge into the aeration tanks to keep the sludge in a fresh condition.

C. E. Keefer—"The Operation of the Back River Sewage Works, Baltimore, Md." *Sewage Works Journal*, May.

### Feeding Cooked Garbage to Hogs

Beginning in 1940, the Welfare Dept. of Kansas City, Mo., has developed a procedure of hog raising by feeding cooked garbage to a herd of 1000, raising them from pigs to 260 lb. hogs, their entire life being

passed on concrete floors. A water line is run through both the feeder and the brooder houses, outlets from which permit easy washing of the pens and spray showers which keep the houses cool in summer. Electric lights and electric heaters are provided in the farrowing pens. The garbage fed is that from the prison kitchens, municipal hospitals, vegetables and fruit discarded at the municipal market. A special cooking house has been built, where garbage is dumped on the floor, shoveled into cooking vats sunk below the floor level, and cooked with raw steam for 50 min., then dropped into trucks on a lower level. The sales of hogs now bring in \$50,000 a year, and the city is saved approximately \$15,000 which would be the cost of collection. The hog mortality rate has been lowered to 12%, considerably below the national average.

Hayes A. Richardson — "Kansas City, Mo., Develops Garbage-Cooking Program to Feed the Hogs"; *American City*, July.

### Refuse Collection And Disposal

According to the U. S. P. H. S. in 1948, \$166,526,000 should be spent in approximately 8,000 communities for adequate disposal of refuse. The needs include 12,535 refuse collection trucks, 1090 incinerators, and 5549 land fill installations. The trend is toward closed collection vehicles with means for elevating the refuse, and in some cases for compacting it 50 to 66%. The average capacities are between 6 and 8 cu. yd., up to a maximum of 22 cu. yd. There is a definite need for a series of standard designs of vehicles, especially for small cities at lower cost.

The estimated costs of the incinerators needed, at 1948 prices, was about \$100,000,000, ranging from \$1500 to \$2500 per ton of 24-hr. capacity. Operating costs range 50¢ to \$1.50 per ton. Of 400 incinerator installations investigated, 134 have been abandoned, most of them because of changing to another method of disposal (12% to sanitary fill) or to larger or new types of incinerators. Of the 400 incinerators, 65% were installed between 1920 and 1939. The larger plants have bridge cranes for charging the incinerators, but cheaper equipment such as motorized trolleys, are available for small plants. One of the most significant advances since 1939 has been the adoption of mechanical stoking equipment with new methods of air introduction, which permit increasing burning rates from the conventional 50 lb. of refuse per

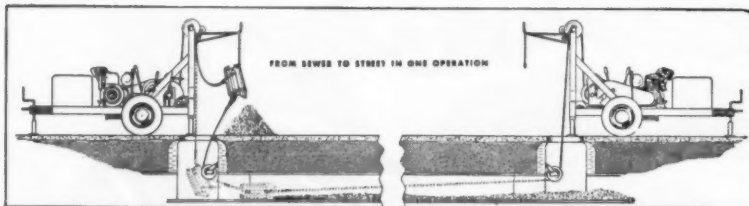
## "FLEXIBLE" POWER BUCKET MACHINES Clean Sewers The "Flexible" Way

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hr. per sq. ft. of inside horizontal furnace area, to 78 lb. and even 112 lb. at Tonawanda, N. Y.

There should be adequate ash hoppers and quenching facilities under the furnace. For small plants, ash conveyors submerged in a trough of water may be used. Regular cleaning of fly ash and heavier ashes from preheaters, combustion and expansion chambers and flues is important; fixed or portable vacuum systems have been used for this purpose.

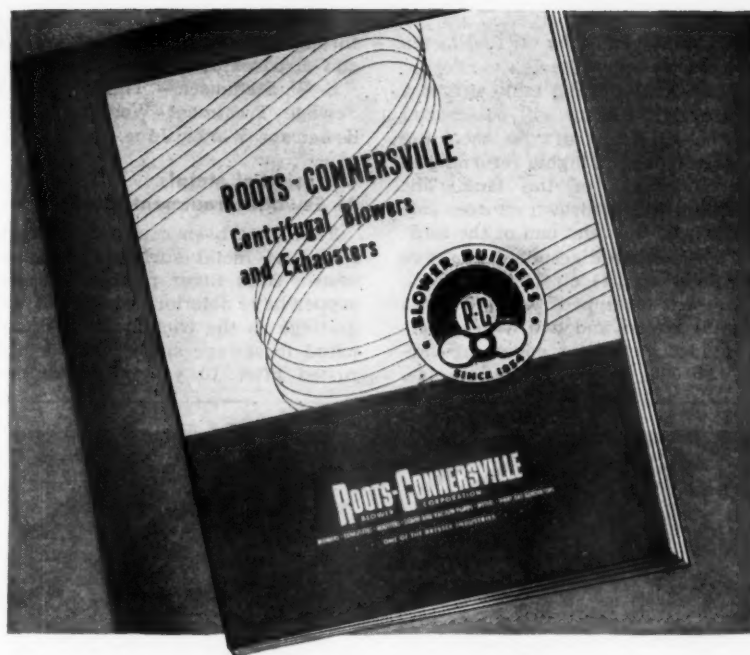
Land reclaimed by sanitary fill has been found still decomposing after 25 yr., giving off CO<sub>2</sub>, methane and other gases, but very little settling occurs after two years. The best use of such land is for parks and other recreational areas, and only buildings needed as functional units of the park should be constructed on the fill. A fill should not be dug into for years, for the odor of partly decomposed refuse would be unbearable.

Of 300 cities of more than 5,000 population which furnished data, 28% used incinerators, 25% sanitary fills, 41% disposed of part or all of their garbage by hog feeding, and 50% had open dumps. Approximately 250,000 household garbage grinders have been installed since 1939.

Report of Committee on Refuse Collection and Disposal, *Am. Soc'y of Civil Engineers Proceedings*, June.

#### New 26th Ward Sewage Treatment Works

Built more than 50 yr. ago, and loaded to double its design capacity when first put into operation and so far overloaded during the past 25 yr. as to have been practically useless, this plant, designed for 3 mgd, has been rebuilt for 60 mgd. Treatment will be by the activated sludge process plus chlorination of the effluent, which is discharged into Jamaica Bay, which is to be made a great recreational area. Sewage reaches the plant through a high level combined sewer and an intercepting sewer at a level 10 ft. lower. Each has its own screening chambers, which the sewage enters through hydraulically operated regulating sluice gates. Three pumps lift from the lower level against a dynamic head of 47 ft. and three from the upper level against 35 ft. head. Grit chambers follow the pumping operation, velocity being controlled between 1.01 and 0.64 fps by critical depth channels. The grit is washed by reciprocating jig-type washers. Power requirements are estimated at 1600 kw average and 2500 kw maximum load, furnished



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Two companion bulletins bring you up to date on Rotary Positive equipment which, with our Centrifugal line, makes up the "R-C dual-ability team." We are the only manufacturer that gives you this *dual choice* of air and gas-handling units. **ROTARY POSITIVE BLOWERS**—Details on design and construction of R-C Rotary Positive Blowers and Exhaustors; performance curves and other helpful data. Bulletin 22-23-B-13.

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by 480,000 cu. ft. of digested gas per day, supplemented by oil fuel in the dual-fuel engines.

The 8 final settling tanks are of a new design. Sludge will be scraped in the direction of the incoming sewage, with the flights returning in the mid-depth of the tank. The overflow will be drawn off over side weirs near the inlet end of the tank.

The 6 sludge digestion tanks give a volume of 2.44 cu. ft. per capita. Four are equipped with Downes floating covers and two with spirally guided gasometer covers providing 140,000 cu. ft. of gas storage.

Digested sludge will be pumped through a 12" pipe to sludge vessels and disposed of at sea.

S. W. Steffensen—"The 26th Ward Sewage Treatment Works"; *Water & Sewage Works*, June.

#### Corrosion of Metals At Sewage Treatment Plant

There has been considerable corrosion of metal surfaces at Baltimore's Back River plant. Steel and copper have deteriorated most. Steel gratings on the trickling filters, exposed to sewage spray, were badly rusted after 10 yr. and were re-

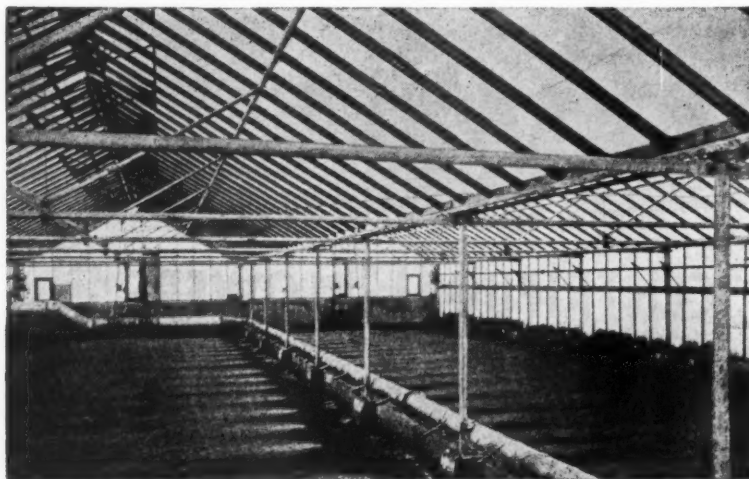
placed with cast iron, which is giving excellent service. Copper gutters and downspouts have deteriorated, as have copper and aluminum fly screens. Bronze and monel metal have been used with considerable success. For handling ferrous and ferric solutions, rubber-lined pipe and iron pipe containing high silica content have proved satisfactory. For handling chlorine gas and solutions containing chlorine, rubber-lined steel pipe, hard rubber pipe and micarta pipe have given good results, but hard rubber is easily broken and micarta pipe may fail if subjected to heavy strains.

C. E. Keefer—"The Operation of the Back River Sewage Works, Baltimore, Md." *Sewage Works Journal*, May.

#### Eradication Of Sludge Flies

Pending the construction of under-drained sludge beds, the Los Angeles County sewage plant has been using shallow lagoons for dewatering digested sludge, and the problem of controlling the *Psychoda* flies became pressing. Spraying with a petroleum by-product had little effect, and burning oil on the beds was not satisfactorily effective. Spraying with a commercial fly spray killed the flies with which it came in contact but not the larvae, so it had to be repeated every 9 days or so. The problem was finally solved by using a solution of 25 lb. of 25% DDT mixed with 150 gal. of water, spraying it at about 100 lb. pressure at the nozzle by means of a "Bean Sprayer," the pump of which is driven by a 1½ hp gasoline engine. Two men in an hour and a half mix the spray and apply the 150 gal. to one acre of surface. At first the entire bed was sprayed at 10-day intervals until the flies had all but completely disappeared. Now it is necessary to spray only the banks and the area of the bed near them. During the past two years very few flies have been seen on the beds.

A. M. Rawn—"Eradication of Sludge Flies"; *Water & Sewage Works*, July.



Interior of American-Moninger sludge bed enclosure at Chicago's Calumet disposal plant. Glass covered sludge bed.

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Gumite Saves Money on Sewer Repair. By D. D. Hankins, City Engr. July, Pp. 30-31.

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Activated Sludge Treatment of Rendering Wastes. By Paul A. Uhlmann, Consult. Engr. July, Pp. 330-332.

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Heating Hot Water for Sludge Digesters. By Morris M. Cohn, Editor. July, Pp. 343-344, 355.

Trickling Filter Plant for a Small Meat Packing Plant. By Allan H. Wymore, Consult. Engr. July, Pp. 347, 355.

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**Water and Sewage Works**

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**Roster of Sanitary and Public Health Engineers**

The American Public Health Association, in cooperation with the National Security Resources Board, is preparing a roster of sanitary and public health engineer citizens of the United States. The uses of such a roster will be manifold, but the immediate purpose of the National Security Resources Board is to provide a means by which trained sanitary and public health engineers can be assured of proper utilization of their professional training should another national emergency arise.

On July 1 the distribution of questionnaires to be used in gathering basic information necessary for the preparation of the roster was begun.

The definition of a sanitary engineer prepared by the National Research Council in 1943 is being used as a basic description of individuals who should receive and complete the questionnaire.

The files of the War Manpower Commission, and the list of engineers who served with the Sanitary Corps of the Army are being amplified by information from national engineering societies, state sanitary engineers, consulting engineers, and others. It is recognized that no single source of information is available for the preparation of the master

mailing list. Many engineers are not registered with state boards of registration. Likewise, many are not members of national engineering organizations. Any sanitary or public health engineer who does not receive a copy of the questionnaire within the next two or three months should notify the Engineering Section Project, American Public Health Association, 1790 Broadway, New York, so that his name can be entered in the master file and a questionnaire sent to him. In this way his name can be included in the roster.

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**MODEL 1-47**

This new Heavy Duty Chem-O-Feeder has many added features for precision control and easier maintenance. Stroke length is instantly adjustable by turning a knob while pump is operating — a magnifying register glass shows exact reading in thousandths of an inch over a range from 2 to 13 cc per stroke. The new Model 1-47 has convenient oil fill and handy sight gauge — all moving parts operate in an oil bath. Plastic "See-thru" reagent head handles any chemical used in the water works field. Available in simplex, duplex and triplex models. Bulletin SAN-7.

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Flow Proportional Feeder — Automatic and Proportional Chem-O-Feeder. Feeds 0-5 GPH at 0-100 p.s.i.



**FOR YOUR CAMP** Du-Self — a complete Package Unit—for water treating. For flows up to 25 GPM and 75 p.s.i.



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## PUBLIC WORKS DIGESTS

# THE WATER WORKS DIGEST

### Reducing Costs of Water Works Operation

The author makes many suggestions for reducing costs, such as: Provide labor-saving tools and equipment, such as air compressors and power hoists. Study trade literature and advertising to keep informed on price changes, development of new products such as pipe, fittings, joints, etc. Replace old, low-efficiency pumping equipment with newer types of higher efficiency. Clean mains and provide additional storage and booster stations. Reduce delinquency in water bills. Reduce unaccounted-for water; check water meters, underground leakage, overflows from tanks, etc. Refinance indebtedness.

Raymond H. Fuller—"Stretching Income to Survive Inflation;" *Am. Work Works Ass'n Journal*, June.

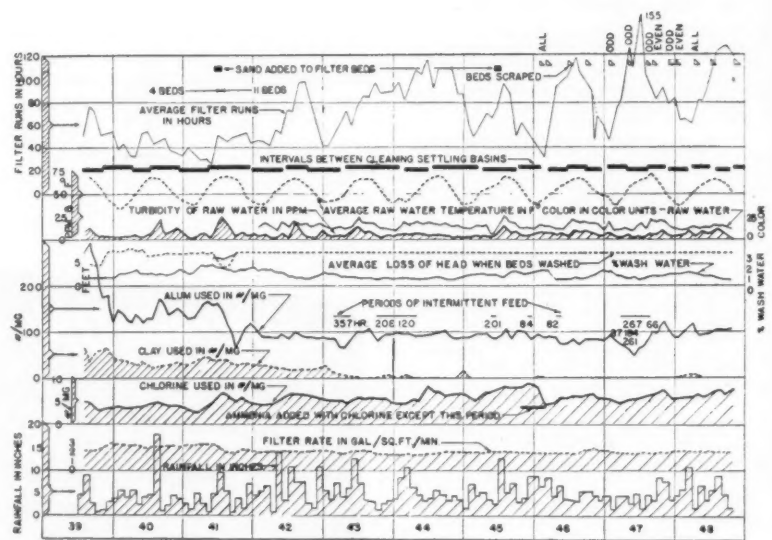
### Bactericidal Properties Of Chlorine Dioxide

Chlorine dioxide, if applied in an amount to give an OTA residual of not less than 0.1 ppm will destroy the common water pathogens at temperatures between 5° and 20° C, and at all pH values above 7.0, with a 5-min. contact period. More resistant forms of organisms require slightly higher residuals for complete kill. The sanitary test organism *Esch. coli* showed slightly higher resistance to chlorine dioxide than the water pathogens, for all conditions of temperature and pH studied. The bactericidal efficiency increases with increase in pH—opposite to the effect of pH using chlorine. But, as with the use of chlorine, the effect decreases somewhat with decreased temperature.

G. M. Ridenour and E. H. Armbruster—"Bactericidal Effect of Chlorine Dioxide;" *Am. Water Works Ass'n Journal*, June.

### Control Board of Ecusta Filter Plant

The Ecusta Paper Corp., in making cigarette papers, uses a large amount of water, which it filters through eleven sand filter beds with a capacity of 20 mgd at the rate of



Courtesy Water and Sewage Works

● 10 YEARS of operation of Ecusta's filter plant.

2 gal./sq. ft./min.; a maximum of 23,126,000 gal. has been filtered in one day. Included in the plant are settling basins; a reservoir; two elevated tanks; and three pumping stations, one at the river, one at the filter plant and one at the reservoir, containing a total of 15 electrically driven centrifugal pumps. There is a very modern and complete laboratory. In this is a control board which centralizes the control of the water system at this one point. On the board are Bristol flow, level, temperature and pH recorders, a Beckman pH amplifier and indicator, a Sparling flow recorder, switches for the 15 pumps, and indicator lights for the filter beds and the revolving screens and minor pumps. Each pump can be operated from this board. A green light indicates a pump is off, a red one that it is on; if neither is on, it is indicated that the pump has lost suction or that for some other reason investigation is called for. For each filter bed a green light denotes that it is idle, a red light that it is filtering. Level recorders give height of water in settling basins, water tanks, reservoirs and fire tank, a red light and alarm bell notifying of condition other than normal. One pH re-

corder records the treated water, the other can be used for either raw, finished or mill supply water. With shortage of labor during the war, this board played an important part in maintaining a high degree of control and operation.

A daily log is maintained, recording hourly the loss of head and rate of flow of the filters, raw water rate, amount of chlorine and ammonia being fed, raw water turbidity and temperature, condition of the floc and the pH of the baffles, the filters washed and the pumps in use.

H. F. Finck and M. M. Matthews—"Ecusta's Modern Filter Plant;" *Water and Sewage Works*, July.

### Bookkeeping for Small Water Companies

There are approximately 95 privately owned water companies in New York State, of which 68 have annual revenues of less than \$15,000, and half of that number \$5,000 or less. The author devised a bookkeeping system for such small plants, as simple as would meet the requirements of the Public Service Commission. Only one book is involved, which provides for receipts and disbursements, a summary of



revenues and a summary of salaries and wages. There are five forms, kept in a single loose-leaf binder. A customer ledger form provides a record of customers, their water facilities, billing, payments, discounts and allowances, accounts receivable and uncollectible operating revenues. The disbursement ledger provides a record of all expenditures for operation, maintenance and repairs, construction of water plant, etc. The operating revenues summary sheet provides a monthly or quarterly and annual summary of customary billing, collections and accounts receivable, as well as a record of other receipts. The salary and wages summary affords a record required by federal social security tax regulations. The weekly labor report consists of pocket-size sheets on the face of which plant employees record the division of their time between operation, maintenance and repairs and water plant activities, and on the reverse side, the units of property installed and retired.

George J. Natt—"Simplified Bookkeeping System for Small Water Companies;" *Am. Water Works Ass'n Journal*, June.

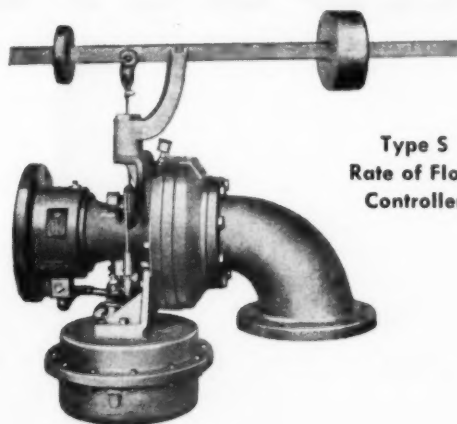
#### New Jersey Ground Water Supplies

Approximately  $\frac{1}{3}$  of the water consumed in New Jersey comes from wells. Although domestic wells individually are of little moment, in the aggregate they provide appreciable amounts. Large but unknown amounts of underground water are withdrawn by private industry. As a means of restoring depleted ground water storage levels, Newark is experimenting in employing excess discharge over spillways of surface water reservoirs. The author suggests the construction of many small dams and spillways on streams tributary to the Passaic and Raritan rivers, the upper half of each reservoir to be available for flood control, while the lower half, being always filled, would permanently raise ground water levels in the vicinity. Land covered by water only when a reservoir was full could be used as recreation areas.

Thurlock C. Nelson—"New Jersey Ground Water Supplies;" *Am. Water Works Ass'n Journal*, June.

The New Jersey Geological Survey in cooperation with the U. S. Geological Survey is making quantitative ground water studies. Based on thorough study of a small part of the state, it is estimated that the total safe yield of the important

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ground water aquifers in the state is on the order of 1 or 2 billion gallons daily. Perhaps the most important measure for increasing the yield is artificial recharge, either by water spreading or directly through wells. For the latter, the water should be of good quality, such as treated surface water or uncontaminated water from cooling plants. The most notable water-spreading developments in New Jersey are those at the Perth Amboy water works, the Duhernal water supply—both near Old Bridge—and the East Orange water works.

The most significant recharge through wells is that undertaken in 1947 at Newark.

Henry C. Barksdale—"Depletion of Ground Water in New Jersey," *Am. Water Works Ass'n Journal*, June.

### Diesel and Electric Deep Well Pumping

The Manhasset-Lakeville Water District, serving an area of 17 sq. mi. on Long Island, N. Y., takes its supply from wells which tap three water-bearing sand strata. Five large-diameter deep wells are

equipped with electrically operated turbine pumps. A group of 23 shallow wells are connected to a horizontal centrifugal pump driven by a 300 hp diesel engine. The deep wells range from 428 to 737 ft. deep, the shallow ones are approximately 150 ft. deep. The cost of power for pumping the electrically driven units ranges from \$40 to \$60 per mg. Power at the diesel plant costs about \$10 per mg; (as this plant is located at the operating headquarters of the district, where men are available 24 hrs. a day, no extra labor cost is incurred.) The water is pumped into two elevated tanks with their flow line 353 ft. above sea level, and approximately 150 ft. above ground level. During 1948, 18,200 ft. of 16", 12" and 10" trunk mains were added to the distribution system, which resulted in reducing discharge pressures at three of the deep well units 15 to 20 psi, and at the diesel plant 15 psi. Also more continuous operation of the cheaper-to-operate diesel plant is made possible. These advantages are expected to permit savings equal to the fixed charges on the new mains.

In 1946 an unusual ground storage tank was installed. It is shaped like a saucer with a flat roof at ground level, 132 ft. in diameter and 23 3/4 ft. center depth, with a capacity of slightly more than 1,000,000 gal. The shape permitted the use of relatively light steel plates in its construction.

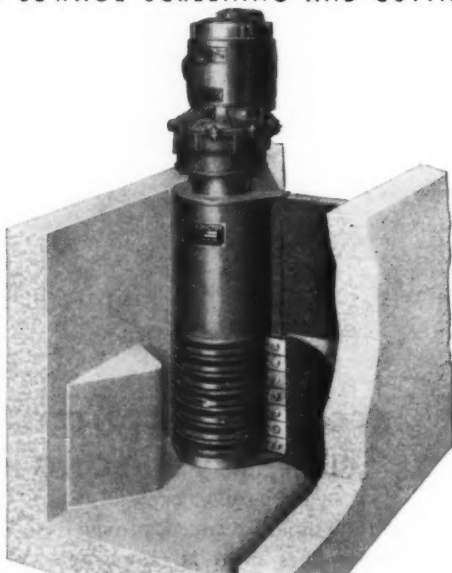
Clarence G. Hamel—"Manhasset-Lakeville District Supply and Practices"; *Water Works Engineering*, June.

### Hazards in Handling Chemicals

Chemicals used in the water supply industry create hazards of various types, the more common of which are creating dangerous toxic atmospheres, dusty atmospheres, burns from acids and alkalis, poisoning, and fire. Heavy containers should be handled by mechanical equipment. A toxic atmosphere may be created by damage to containers of liquid chlorine, sodium hydroxide, sodium hypochlorite, anhydrous ammonia and sulfur dioxide. Burns may be caused by sulfuric acid, sodium hypochlorite, ferric chloride and others. Cylinders containing liquefied gases under pressure should not be stored in the operating rooms. Aluminum sulfate, magnesium sulfate, lime, sodium carbonate and activated carbon are dusty to handle. Two methods of dust control are available—to provide a special box over the mixing

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Angus D. Henderson—"Hazards in Handling Chemicals"; *Water Works Engineering*, June.

#### Lining Newark's 60-Inch Water Main

Newark, N. J., has recently lined more than six miles of 60" riveted steel mains laid in 1902, tubercles in which had reduced the Hazen & Williams coefficient to about 80. After the pipe had been thoroughly cleaned down to the bare metal, it was lined with cement mortar 7/16 inch thick, which completely covers all rivet heads and lap joints. This lining was placed by the Centrline Corporation, which employs an electrically operated machine which places and trowels the mortar. The sand used for the mortar was washed, completely dried and sieved, and bagged and kept under cover until used. The mortar is machine-mixed above ground and chuted into small cars that are pushed through the pipe to the rear of the lining machine. As it requires several of these cars to keep the lining machine in continuous operation, they are so made that the empties can pass over the tops of the loaded cars in returning for a new load of mortar, the wheels of the upper car riding on flanges of the car beneath. The operator, sitting in the rear of the machine, observes and controls the placing and troweling of the mortar, made plainly visible by a floodlight. The machine lined a 50-ft. radius bend with the same success as the straight pipe.

Laurie M. Leedom—"Newark Cleans and Lines 60" Water Main;" *American City*, May.

#### Protecting Houston's Water Supply

The water supply of Houston, Tex., in 1948 came from 33 wells, 3 of which were drilled that year, one to a depth of 2530 ft. The water is pumped into reservoirs, being pre-chlorinated ahead of the reservoirs. Coliform group occurrence was 0.5% for the supply wells; 0.43% for the reservoirs; 0.07% for the

plant taps; and 1.45% for the distribution system. Chlorine demand curves were run on all wells and the chlorine dosage adjusted thereby. The average dosage was 1.48 ppm and the residual entering the distribution system 0.79 ppm, reduced from 1.76 and 0.89 ppm respectively in 1947, without affecting the quality of the water. The residuals in the distribution system varied from 0.4 to 0.7 ppm. A W&T amperometric residual chlorine recorder was tested at several of the plants and was found to furnish accurate data, permitting satisfactory control of the

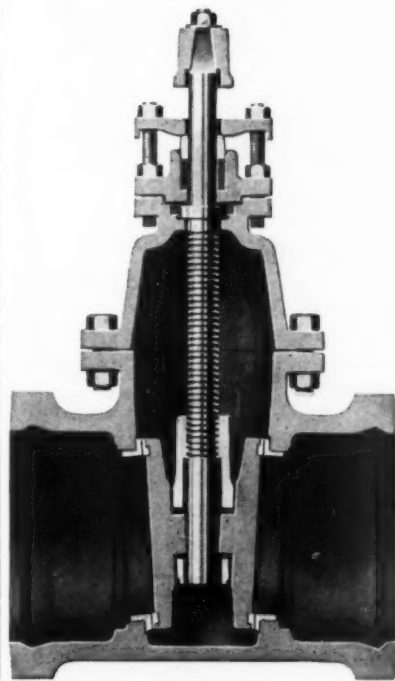
treatment. A difficulty in providing satisfactory water was presented by dead ends in the distribution system, of which there were 274; approximately half of the main flushing done was made necessary by these.

"What Houston Did to Protect Its Water Supply"; *PUBLIC WORKS*, July.

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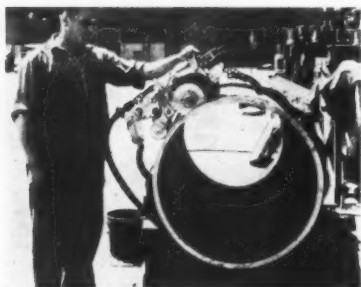
116½ East High Street, Bryan, Ohio

# PUBLIC WORKS

## Equipment News

### Portable Pipe Saw for 8" to 48" Water Pipe

This portable pipe saw, a circular sawing machine, is fast and makes a clean, smooth, straight cut. It is handled and set by one man, and cuts any size of pipe from 8-in. to 48-in.,



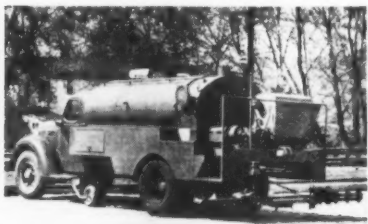
**Cuts pipe quickly**

cast iron, wrought iron or steel, new or old. A 24-in. pipe, either steel or cast iron, requires about 25 minutes for cutting. Operation is by an air motor. An illustrated booklet is available from Silent Hoist & Crane Co., Brooklyn 20, N. Y.

Use coupon on page 77; circle No. 8-2

### "Spray King" Pressure Bituminous Distributor

This is a low-priced unit with many unusual and useful features, including: End folding bars, both full circulating and suckback; low pressure or atomizing torch type burners; single valve control; heat chamber for pumps and valves; flue liners in main flues; mechanical lift for adjusting spray bars; rear filler connection; and hand spray attachment. Capacities are from 800 to 2,000 gals. There are two basic models, vaporizing torch burner and low pressure atomizing burner; either



**For all bituminous work**

can be truck or semi-trailer mounted. The unit can be used for hot or cold road oils, tar, asphalt, emulsions or cut-back. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, Ohio.

Use coupon on page 77; circle No. 8-3

### For Drilling Hard Concrete Faster

Reports from users of this new carbide-tipped bit show that costs of drilling in hard concrete can be reduced from as much as 14¢ per hole to less than 2¢ per hole, with no re-sharpening necessary. In granite, costs have been as low as 3¢ per



**Per hole—2 or 3 cents**

inch. These drills are available in sizes from 3/16" through 1", and can be furnished with suitable chucks for use with any type of electric hammer. A descriptive folder is available from New England Carbide Tool Co., Inc., 60 Brookline St., Cambridge 39, Mass.

Use coupon on page 77; circle No. 8-4

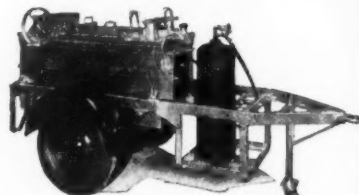
### Radiotelephone Unit for Those New FCC Rules

A mobile radiotelephone unit, with a power output of 10 watts at any frequency in the 152-162 megacycle band, and complying fully with the new FCC rules and regulations, has been developed for use with repair and maintenance trucks, snow plowing, police, fire and general public works. Weight is only 27 pounds. This is the new FT-145-10 Federal Telephone & Radio Corp. unit. For full information, address Federal at 100 Kingsland Road, Clifton, N. J.

Use coupon on page 77; circle No. 8-5

### Aeroil Kettle for Rubberized Compounds

A new 50-gal. kettle for heating and melting rubberized asphalt and other joint sealing compounds is constructed on the double boiler system, using heat bath oil. Accu-



**Kettle for joint sealing**

rate thermostatic controls include a shock-proof, 2-pole thermostat calibrated from 100° to 550°F. This new unit, the 50 DVP, is available on either a pneumatic tired trailer or on skids for mounting on a light motor truck. Bulletin 310-50 gives many additional details. Write to Aeroil Products Co., Inc., Wesley St., South Hackensack, N. J.

Use coupon on page 77; circle No. 8-6

### Variable Weight Tandem Rollers

Three new variable weight tandem rollers have been announced by Buffalo-Springfield. These are the



**Any weight you want**

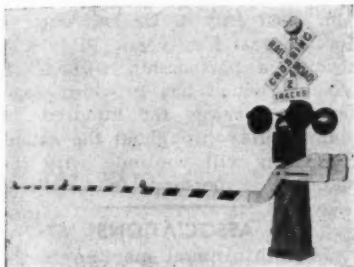
KT-14, from 5 to 7 tons; the KT-19, from 8 to 12 tons; and the KT-20, from 10 to 14 tons. They are available with either gasoline or diesel engines. There are many handy and excellent mechanical features which are described in Catalog S-57-49. Buffalo-Springfield Roller Co., Springfield, Ohio.

Use coupon on page 77; circle No. 8-7



### Streamlined Crossing Protection Gate

An outstanding feature of this crossing protection gate is the combination of power and gravity which provides positive operation under the most severe weather conditions. Gate arms are available up to 40 ft. Sidewalk gates can be provided if



How to protect crossings.

desired. Controlled descent speed meets the AAR requirements; ascent speeds can be regulated as desired. Instant reverse is provided on ascent to prevent that accident from the second train. This gate may solve your bad crossing problem. Write to Griswold Signal Co., 1706 Linden Ave., Minneapolis 3, Minn. Use coupon on page 77; circle No. 8-8

### Warco Extra Heavy Duty Motor Grader

The new 4D-100 extra heavy duty motor grader has been announced by W. A. Riddell Corp., Bucyrus, Ohio. This is the first 100-hp grader made by Warco; it is designed to handle easily the work involved in today's heavy construction projects. It is hydraulically controlled, and has unusual blade reach and under clearance. Fuller information is available from Warco.

Use coupon on page 77; circle No. 8-9

### Easy-to-read Chrome Chain Tape

This new chain tape is made of tough, flexible, spring-tempered steel, with heavy chrome plate which gives a hard, non-glare surface which will not chip or crack, resists wear



Lufkin Hi-way drag tape.

and corrosion, and is very easy to read. It is made in 100, 200 or 300-ft. lengths; tapes over 100 ft. long have a 4-arm reel. Three types of graduations and numbering are available. For information on these and on which suits your needs best, write to Lufkin Rule Co., Saginaw, Mich.

Use coupon on page 77; circle No. 8-10

### Magnetic Sweeper for Roads and Airports

This unit is designed specifically for magnetically sweeping airport landing strips, roads, driveways, construction roads, and streets of metal waste which might cause accidents or damage to rubber-tired traffic. It is an electro-magnet sweeper, powered by a gasoline engine driving a 7½-kw generator, with self-contained switchboard, all mounted on a trailer. Sweeping is over an area 26" by 96". Specifications and photographs are available from International Diesel Electric Co., Inc., 13-02 44th Ave., Long Island City 1, N. Y.

Use coupon on page 77; circle No. 8-11

### Sickle Bar Mower for Close Work

This new low-price sickle bar mower has a 36-in. cut and is powered with a 1½-hp 4-cycle engine.



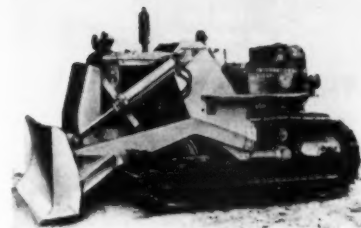
Cuts in close quarters.

This mower is especially adapted to cutting along fences, under power lines, along highways, and in parks and airports, as well as for lawn work. Full information on this mower from James Cunningham, Son & Co., Rochester, N. Y.

Use coupon on page 77; circle No. 8-12

### Hydraulic Dozer on IHC Wide-Gauge Tractor

Here is a straight dozer, though an angled dozer of the same general design is now being tested in the field. It is hydraulically controlled and operated and is mounted on the International TD-14 wide gauge tractor. Mounting is entirely on the tractor main frame; the standard gauge



Bros Dozer on IHC tractor.

blade on the wide gauge tractor permits full utilization of tractor power. Technical details of this new unit can be obtained from Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn.

Use coupon on page 77; circle No. 8-13

### New Materials Handling 10-ft. Loader

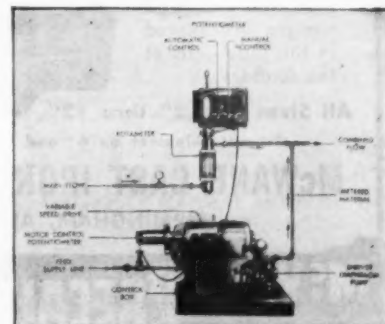
The TL-B Tracto-Loader, which has a 10-ft. bucket, is mounted on rubber tires and has a hydraulically controlled bucket that can be dumped in whole or in part to a height of about 5 ft. Over-all length with bucket down is 9'5" and wheel base is 4'1". Major tractor components are from Allis-Chalmers tractors, but the loader is not merely mounted on an A-C tractor as stated erroneously in our June issue. The TL-B is a smaller unit, but similar in design to the half-yard TL-W, recently introduced. More information from any Allis-Chalmers dealer or from Tractomotive Corp., Deerfield, Ill.

Use coupon on page 77; circle No. 8-14

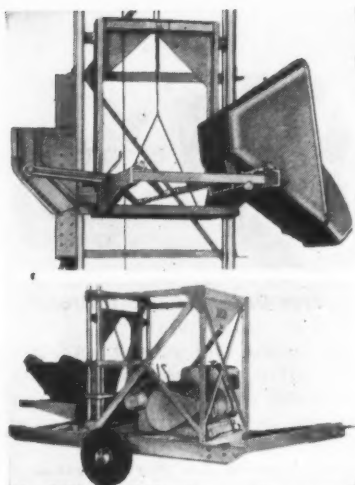
### Proportional Feeder for Viscous or Abrasive Materials

In this feeder, all parts coming into contact with the material to be pumped are of resistant metals, and all working parts are separated by rubber diaphragms and immersed in oil. There are no stuffing boxes or glands. It will feed at pressures up to 100 psi, and can readily be set to provide either constant or proportional flow. Bulletin 129 describes this unit. T. Shriver & Co., Inc., Harrison, N. J.

Use coupon on page 77; circle No. 8-15



Feeds difficult materials.



**Half-yard concrete bucket and trailer-transporter are two new accessories on Jaeger's Self-Raising Hoist Tower.**

Use coupon on page 77; circle No. 8-16

#### Weed Killers and Insecticides

The newest thing in chemical weed and brush control is said to be 2, 4, 5-T, a sort of cousin of 2, 4-D, but with a name too long to mention here. It is especially good for black-

berries, poison oak and willows. Estericide-T 245 is also announced as an easily handled weed killer. A new development in the pest control field is Isotox, a liquid concentrate. This is effective on DDT-resistant pests, is odorless, easy to mix and use, and non-irritating. These are all products of the California Spray-Chemical Corp., Richmond, Calif.

Use coupon on page 77; circle No. 8-17

#### Fleet Joins American Well Works

Gerald A. Fleet has been appointed District Manager for the American Well Works, Aurora, Ill., for the New York City and contiguous area, with offices at 475 Fifth Ave., New York 17. Gerry Fleet was with the New York State Department of Health before the war, and has since been engaged in consulting engineering work.

#### A JOB FOR AN ENGINEER

A sewage disposal plant operator is wanted to operate and take complete charge of the new 125 mgd modified aeration plant at Philadelphia. He must have broad experience and ability. Salary is \$6640-\$7440 per year. Job will be filled by non-as-

sembled competitive examination. Applications must be filed on required form before Sept. 9, 1949. For further information write to Civil Service Commission, Room 875, City Hall, Philadelphia 7, Pa.

#### E. B. Black Dies

E. B. Black of Black & Veatch, Consulting Engineers, Kansas City, Mo., died July 4. He had been ill for the past four years. In 1915 he formed a partnership with N. T. Veatch, which has provided engineering services for hundreds of communities throughout the nation. The firm will continue with the same name, personnel and policies.

#### ASSOCIATIONS

The 15th Annual meeting of the South Dakota Water & Sewage Works Conference will be held at the Alex Johnson Hotel, Rapid City, S. D., Sept. 28 to 30. Wally Towne, secretary (Pierre), says "try to come out and see us then."

The Florida Section of the AWWA will meet at the Orange Court Hotel, Orlando, Fla., Nov. 14 to 16. A. E. Williamson, Jr., is secretary; his address is Box 1431, Daytona Beach, Fla.

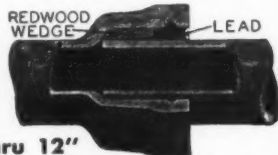
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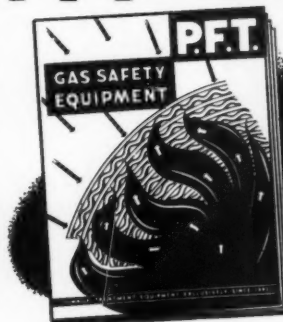
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**Rolling Steel Doors.**—Along with other metal work, rolling steel doors are described, detailed and specified, giving full information for the designer. Most any width or size. Cornell Iron Works, Inc., 36th Ave. and 13th St., Long Island City, N. Y.

**Corrosion Resistant Pumps.**—A 20-page bulletin with much information and data on pumps and packings for handling all kinds of corrosive liquids. Duriron Co., 17 East 42nd St., New York 17, N. Y.

**Large Capacity Water Meters.**—Bulletin W-807 describes large capacity disc type water meters, with many sectional and view drawings and complete specifications. Pittsburgh Equitable Meter Division, Rockwell Mfg. Co., Pittsburgh 8, Pa.

**Aluminum Paints.**—How to use aluminum paints on wet walls, on brick, metal, wood or concrete; and plenty of other information, is contained in this 24-page book. Sent on request to Aluminum Industries, Inc., 2438 Beekman St., Cincinnati 25, Ohio.

**Crawler Tractors.**—These folders describe International tractors, the TD-18 of 80.5 hp.; the TD-14 of 57 hp.; the TD-9 of 39 hp.; and the TD-6 of 29.5 hp. Work applications for each size. Complete specifications are given for each. International Harvester Co., Chicago, Ill.

**1,000-Lb. Portable Asphalt Paving Plant.**—A 12-page illustrated bulletin, No. 200-88, describes this new portable batch-mix asphalt plant. Specifications, diagrams and erection and operating data are given. Especially designed for small communities and local contractors. Madsen Iron Works, Huntington Park, Calif.

**Snow Loaders.**—A 16-page catalog showing the complete line of snow loaders, with the data needed to see how they can apply to your own problems. George Haiss Mfg. Co., 141 to 144 St. & Park Ave., New York 51, N. Y.

**Recorders and Controllers.**—A 32-page catalog covering a complete line of strip-chart Micromax recorders and controllers for measuring temperature, speed, pH, gas analysis and other factors. Catalog ND44(1). Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

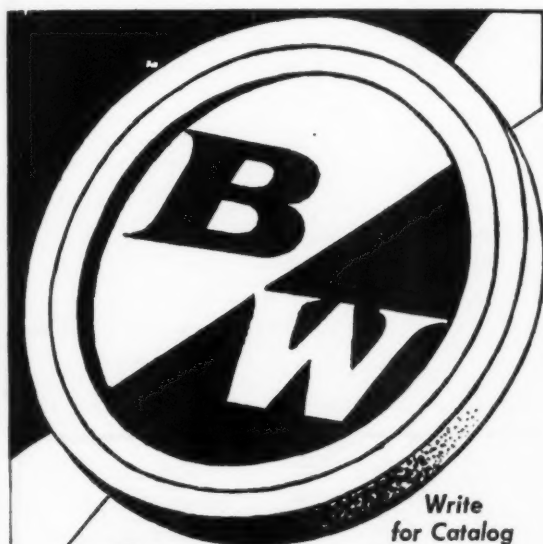
**Rust Prevention.**—Data sheets describe Neil-Coat rust preventive and primer, including development, method of preparing rusted surfaces, how to apply, temperatures, colors, kind of protection afforded, and how to apply paints over this coating. Neilco Laboratories, Detroit 26, Mich.

**Engines and Power Units.**—A typically excellent IHC booklet, No. A-164-MM, 12 pages, showing design features, illustrating uses, and presenting "quick-read" charts of horsepower, torque and fuel consumption. International Harvester Co., 180 N. Michigan Ave., Chicago, Ill.

**Centrifugal Pumps.**—This booklet not only describes the various Rex pumps, but tells how to figure the right pump for the job. 12 pages. Ask for Bull. 47-12, Chain Belt Co., 1600 West Bruce St., Milwaukee 4, Wisc.

**Red Lead Primers.**—Technical Letter No. 3 covers the use of red lead primers for atmospheric exposure, using oil, oil-varnish and synthetic primers. Lead Industries Ass'n., 420 Lexington Ave., New York 17, N. Y.

**Dumpcrete Concrete.** A new illustrated pamphlet showing the many uses of the Dumpcrete body for hauling concrete without agitation. Action pictures and description of advantages. Ask for L-102. Dumpcrete Division, Maxon Constr. Co., Inc., 131 N. Ludlow St., Dayton 2, Ohio.



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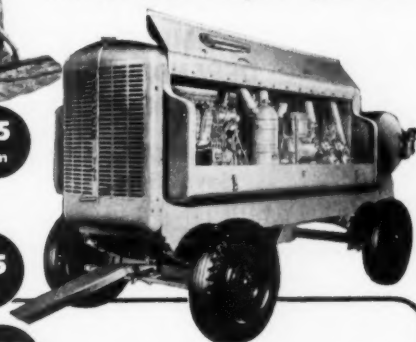
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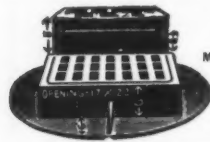
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### Data on Modern, High-Rate Water Treatment Plant

40. This handsome 28-page bulletin gives a comprehensive yet understandably written story of the development of the Accelerator, and explains its principles, advantages, design considerations, operation and applications. Helpful flow diagrams and specifications. For a copy use the coupon or write Infilco Inc., 325 W. 25th Place, Chicago 16, Ill. Ask for Bulletin 1825.

### Easily Portable Pump Has Many Uses

70. A new bulletin (LP-9) describes the Jaeger "Bantam" sure-prime portable pump. The lightweight unit pumps up to 5700 gph; a larger portable model has capacity up to 9000 gph. Be sure to check this handy unit, invaluable for all light drainage work. Write Jaeger Machine Co., Columbus 16, Ohio.

### Turbidity, Color and Hardness Removal

77. Modern water pre-treatment with Dorr equipment and methods is described in Bulletin No. 9141, which gives basic design data and flowsheets for pre-treating highly turbid water, color removal or treatment of low turbidity, and softening. Typical analyses for various types of waters are given together with detention times in recommended treatment units. Write The Dorr Co., Dept. PW, 570 Lexington Ave., New York 22, N. Y.

### Helpful Booklet on Sewer Joint Sealing

89. Detailed information on the use of "Kalktite," a cold-applied asphaltic sewer joint cement, is given in the new catalog issued by Prestite Engineering Co., Dept. PW, 3900 Chouteau Ave., St. Louis 10, Mo. Lab reports show characteristics; table gives quantities needed for vitrified clay sewer pipe.

### Preventing Corrosion by Salt Used on Streets and Highways

150. Technical data on characteristics, test results and results in use of the Nalco Corrosion Inhibitor No. 818-C are given in a new leaflet. Data based on winter 1948-1949 shows how small dosage of inhibitor protects exposed metal surfaces. Get Bulletin 44 from National Aluminate Corp., Dept. PW, 6216 West 66th Place, Chicago 38, Ill.

### 20-Page Weed Control Handbook

151. To help you do a better job of chemical weed control recommended dosages, dilutions and application methods for weed control under all conditions are outlined in this handy, pocket-size booklet. For a copy write Howard Hanson & Co., Dept. PW, Beloit, Wis.

### Get Data on Snow Plows Now

152. Now is the time to get data on truck snow plows. The new Bulletin No. 1002 issued by Baker Mfg. Co., Springfield, Ill., has complete dimensions and specifications enabling you to determine the exact plow to meet your specifications. Everyone interested in snow removal should have a copy.

### How to Select Concrete Vibrators

153. Concrete vibrator designs vary according to the type of work to be done. In their Bulletin 814 Chicago Pneumatic describes effective vibrators, both air powered and electric, for all types of construction. Write Chicago Pneumatic Tool Co., Dept. PW, 6 East 44th St., New York 17, N. Y.

### A New Explosives Handbook

163. Explosives, blasting supplies and accessories for every class of work are described in this new 40-page handbook. The principle characteristics of commercial explosives are given in detail, and a useful table lists explosives recommended under average conditions, according to work to be done. For a copy write: Illinois Powder Mfg. Co., Dept. PW, 730 Pierce Bldg., St. Louis, Mo.

### Attractive Glass Enclosures For Sludge Drying Beds

164. Complete design details on American-Moninger glass sludge-bed enclosures are included in bulletin GE-31 issued by the American-Moninger Greenhouse Mfg. Co., 1820 Flushing Ave., Brooklyn, N. Y. This 24-page bulletin also shows a number of typical installations and furnishes complete specifications on construction details.

## SEWERAGE AND REFUSE

### Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walls and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 10, Wis.

### New Unit Cleans Catch Basins in a Jiffy

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

### How to Lower Costs Of Refuse Collection

35. For saving trucks, labor, and time in city rubbish collection get details of the new Dumpster-Kollector described in literature just published by Dempster Bros., Inc., 996 Higgins, Knoxville 17, Tenn.

### Packaged Sewage Treatment—Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2348 Wolfram St., Chicago 18, Ill.

### Design Details for Sludge Collectors

42. Booklet No. P.W. 1742 on Link-Belt Circuline Collectors contains sanitary engineering data and design details. Catalog No. 1742 on Straightline Collectors, contains layout drawings, illustration pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

### Standard Forms for Concrete Pipe

67. Concrete pipe for sewerage, drainage and culvert projects can be produced quickly and uniformly with Quinn Standard concrete forms. Data on forms for 12" to 84" tongue and groove or bell end reinforced pipe from Quinn Wire and Iron Works, 1621 12th St., Boone, Iowa.

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### Pumps Suitable For Every Purpose

100. Large size trash pumps, propeller pumps, angle-flow pumps—a type suitable for every service. A separate bulletin for each is furnished by Fairbanks, Morse & Co., Fairbanks-Morse Bldg., Chicago 5, Ill.

### Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment, constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connorsville Blower Corp., 712 Poplar Ave., Connorsville, Ind.

### How to Make Sewage Plant Grit Suitable for Fill, Roadways

138. The Jeffrey "Jigrit" washer does a thorough job of scrubbing grit free of organic solids. Grit is classified according to size and organics rejected with overflow. 44-page Catalog 775A describes the "Jigrit" and gives engineering data and installation views of grit and sludge collectors, chemical feeders, garbage grinders and other equipment as well. Dept. PW, Jeffrey Mfg. Co., 948 N. Fourth St., Columbus 16, Ohio.

### An Incinerator Necessity

139. Recuperator tubes made from Silicon Carbide and "Fireclay" corebustors for maximum efficiency are described and illustrated in Bulletin 11 issued by Fitch Recuperator Co., Dept. PW, Plainfield Natl. Bank Bldg., Plainfield, N. J.

### Standard Translot Blocks For Filter Underdrains

145. Proper filter underdrainage is extremely important. Specifications and installation details for transverse slot filter underdrains made of durable vitrified clay are available from Texas Vitrified Pipe Co., Mineral Wells, Texas.

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### Solve Your Drainage Problems This Easy, Permanent Way

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"Armeo Products for Engineering Construction," Armeo Drainage and Metal Products, Inc., Dept. PW, Middletown, Ohio.

### Methods of Installing Steel Sheet Piling

30. Illustrated descriptions of both standard and interlock corrugated steel sheet piling of minimum weight, maximum strength, ease of handling with methods of installation are contained in a booklet. If you have a job involving piling write Caine Steel Co., Dept. PW, 1820 No. Central Ave., Chicago 30, Ill.

### Power Saw Speeds Pruning, Clearing

69. Don't wait until storms have broken limbs and felled trees before finding out about the new light-weight engine powered chain saw announced by McCulloch. Ideal for all contracting and tree-maintenance operations. Get bulletin from McCulloch Motors Corp., Dept. MP, 6101 W. Century Blvd., Los Angeles 45, Calif.

### Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wisc.

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82. Substantial cost-per-hole savings are claimed for Tilden Rotary Drills which penetrate concrete 2" to 4" per minute. Cutters can be resharpened. Available in sizes 1/4" to 4". Get full data from Tilden Tool Mfg. Co., 1995 N. Fair Oaks Ave., Pasadena 3, Calif.

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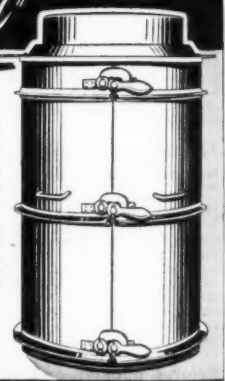
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### Do Your Water Mains Need Cleaning?

38. Literature on Flexible method of cleaning water mains any size from 2" to 72", giving full details and list of nearest representatives in all parts of country. Address: Flexible Underground Pipe Cleaning Co., 9059 Venice Blvd., Los Angeles, Calif.

### Solve Corrosion Problems With This Special Alloy

41. "Everdur Metal" is title of an 8-page illustrated booklet describing advantages of this corrosion-resisting alloy for sewage treatment equipment, reservoir, and waterworks service. Dept. P.W., The American Brass Co., 25 Broadway, N. Y. C.

### Eliminate Taste and Odor From Your Water

53. Technical pub. No. P.W. 213 issued by Wallace & Tiernan Co., Inc., Newark, 1, N. J., describes in detail taste and odor control of water with Break-Point Chlorination. Sent free to any operator requesting it.

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64. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M. & H. Valve & Fittings Co., Dept. P.W., Anniston, Ala.

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### Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co., Dept. 4, 6750 Upland St., Philadelphia 42, Pa.

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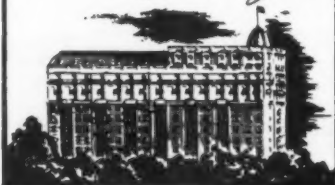


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### Liquid Level Control

78. Description of operating principles and applications of B/W controls shows the simplicity and many uses of these all-electric, floatless devices. Diagrams of typical installations and engineering data all in bulletin 147 issued by B/W Controller Corp., Dept. PW, Birmingham, Mich.

### Job Data Offered on New Steel Water Lines

80. A 12-page illustrated report listing pipe diameters, pipe wall thicknesses, line pressures, coatings, engineering personnel, etc., is entitled "A Report of Dresser-Coupled Steel Water Lines in the Year 1948." A copy will be sent by Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

### Speedier, Space-Saving Purification Apparatus

81. A new 12-page bulletin, No. 2204, tells how the Spaulding Precipitator, in removing impurities from a liquid by precipitation, adsorption, settling, and upward filtration, occupies less space, uses less chemicals and speeds up treatment. Permutit Co., 330 West 42nd St., New York 18, N. Y.

### Pipe That Is Immune to Tuberculation and Corrosion

104. Transite Pipe. The high strength and low weight of pipe moulded under pressure from asbestos fibre and cement, together with its immunity to tuberculation and corrosion is the subject of a 32-page pamphlet. Johns-Manville, Box 290, New York 16, N. Y.

### Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 289, East Orange, N. J.

### How About Centrifugal Pumps?

108. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Write to Dept. P.W., Peerless Pump Div., Food Machinery and Chemical Corp., 301 W. Ave. 26, Los Angeles 31, Calif.

### Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

### Handy Catalog Describes Small Hydrants, Drinking Fountains

115. This 32-page catalog describes ¾" to 2" hydrants. Also street washers,

drinking fountains and other water service devices. The Murdock Mfg. & Supply Co., 426 Plum Street, Cincinnati 2, Ohio.

### Rust Wastes Your Money

121. You'll want data on the all-purpose anti-rust coating that can be brushed or sprayed on all metal surfaces, even those already attacked by rust. For full information on this firm, elastic coating write Rust-Oleum Corp., 2443 Oakton St., Evanston, Ill.

### Data on Chlorinizer Now Available

132. Bulletin 840-F2 features the Builders Chlorinizer and shows complete details of apparatus to accurately meter chlorine gas and deliver controlled chlorine-water solution. Positive rate of flow indication, wide metering range. Get your copy of this bulletin from Builders-Providence, Inc., 16 Coddling St., Providence 1, R. I.

### All About Cement-Mortar Lining of Water Mains

133. Here, in a really beautiful booklet, is practically everything you need to know about this method of lining mains in place—the needs, methods, and results that will interest you. Centrline Corp., Dept. PW, 140 Cedar St., New York 6, N. Y.

### Newly Designed Watersphere— the Modern Elevated Tank

146. A handsome leaflet describes the newly redesigned Watersphere, built in capacities from 25,000 to 250,000 gals., 50 to 125 ft. to bottom. Sphere is supported on a single, gracefully curved column. Be sure to investigate this tank of pleasant appearance and modern welded construction. Data from Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

### Faster Pipe Laying With Precaulked and Threaded Joints

149. McWane 2" cast iron water pipe with threaded joints and pre-caulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

### Helpful Book Gives Pipe Flow

159. This handy 40-page pocket size book titled "Measurement of Water Flow Through Pipe Orifice with Free Discharge" explains the Layne pipe orifice meter method of computing water flow. Includes flow graphs for various size pipes. Layne & Bowler, Inc., Box 215, Hollywood Station, Memphis 8, Tenn.

## SNOW FIGHTING

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44. "Frink One-Way Sno-Plows" is a four-page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow, Frink Sno-Plows, Inc., Clayton, 1000 Islands, N. Y.

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22. BG Maintainer, a powerful speedy, low-priced machine for light road maintenance. Full details in illustrated folder. Huber Mfg. Co., Dept. PW., Marion, Ohio.

### Data on All Types of Bins and Batching Plants

47. Good illustrations and useful data on all types of Heltzel Highway Bins, for truck mixer charging, bulk cement plants, enclosed bucket elevators, belt conveyors, etc. Heltzel Steel Form & Iron Co., Dept. PW. Warren, O.

### Speed Your Work With These Powerful Motor Graders

48. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many actual pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

### Fast, Efficient Skid-Proofing

114. Get full facts about Baughman Light-Weight Cinder Spreaders, fast operators for cinders, sand, salt, chips, etc. Free flowing at low temperatures. 9-17 cu. yd. capacity. Write Baughman Mfg. Co., Dept. PW, Jerseyville, Ill.

### Fall Months Are Good For Grass Planting

123. For every step in lawn care and seasonal maintenance hints be sure to read "Lawn Care," an interesting periodical sent without obligation by O. M. Scott & Sons Co., 81 Spring St., Marysville, Ohio.

### How to Speed

#### Curb and Gutter Work

126. Here's a 24-page bulletin illustrating form set-ups for every type of curb and gutter work. Send for Bulletin 2259 and learn how to speed up the job with Blaw-Knox Steel Street Forms. Write Blaw-Knox, Dept. PW, Farmers Bank Bldg., Pittsburgh 22, Pa.

### Adhesive Joint Sealers and How They Are Applied

130. Learn how joints are prepared and Flintseal Hot-Poured Joint-Sealing compound applied. Series of pictures shows each step and explains every operation for good joint construction. On request from The Flintkote Co., Dept. PW, 30 Rockefeller Plaza, New York 20, N. Y.

### Modern Sweeper

#### Speeds Street Cleaning

162. The Austin-Western Model 40 sweeper features three wheel design, front wheel steer, for easy maneuvering; rear broom to sweep dirt and refuse directly into 2-yd. hopper; built-in flushing device. Diagrams showing all operations and full specifications in Bulletin AD-2042, issued by Austin-Western Co., Aurora, Ill.

## POWER AND LIGHT

### Dual Fuel Engines for Municipal Power

27. A new 8-page illustrated bulletin, No. 4811, describes Superior Dual Fuel Diesel engine operation and illustrates the simplicity of controls with fuel conversion by either push buttons or hand lever. Copies are available from Superior Engine Div., Dept. PW, The National Supply Co., Springfield, Ohio.

### Low Cost Power

#### From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

# Fall is the ideal time for lawns to acquire *Scott's* LAWN PERFECTION

North, South, East or West . . . Fall is the best time to revive old lawns and especially to build new ones . . . Seed usually germinates in 6 to 8 days. And Scott's Seed and Turf Builder have an enviable nationwide reputation for developing thick, deep rooted, permanent grass which will not fold up under next summer's scorching sun. Plan now to use Scott's Lawn Care Products and the lawn around the plant or at home will have that velvety, sparkling green appearance which is admired by everyone. Available in most communities from Maine to California, or write direct concerning your requirements and ask for a FREE subscription to Lawn Care.

O M *Scott & SONS CO.*, 16 Fourth St., Marysville, Ohio and Palo Alto, Calif.

**FREE . . .** 2 year subscription to *Lawn Care*, tells how to build and maintain year 'round lawn beauty. Deluxe ring binder of all back issues on request.



## STATE HIGHWAYS Choose EAGLE LOADERS

• Hard at work on the thousands of miles of state highways, these Eagle loaders are speeding up the handling of windrow dirt, loading from stock piles, snow removal (in season), etc. Eagles can load more — faster!



- 3 to 5 yds. per minute
- One man operated
- Job to job at truck speeds

Write for detailed specifications—Dept. PW-8



# EAGLE

JAW CRUSHERS • IMPACT BREAKERS  
PULVERIZERS • CONVEYORS • LOADERS

**CRUSHER CO., Inc.** GALION OHIO-U.S.A.



## HYDRANTS

### VALVES

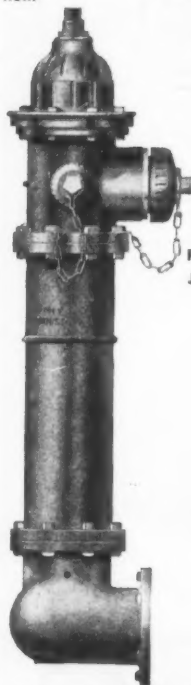
and

### WATER WORKS ACCESSORIES

A. W. W. A. type iron body, bronze mounted with double-disc parallel seat or solid wedge type. Non-rising stem, outside screw and yoke, or with sliding stem and lever. Also furnished hydraulically operated. Square bottom type operates in any position.



M & H furnishes both regular type A. W. W. A. fire hydrants and special Traffic Model designed to yield at the ground line under impact.



Valves & Hydrants  
Furnished Mechanical  
Joint When Desired

#### M & H PRODUCTS INCLUDE—

Fire Hydrants  
Gate Valves  
Tapping Valves  
Special Castings  
Tapping Sleeves  
Check Valves  
Floor Stands  
Extension Stems  
Mud Valves  
Flap Valves  
Sludge Shoes

## M & H VALVE

AND FITTINGS COMPANY  
ANNISTON, ALABAMA

### WORTH TELLING

By Arthur K. Akers

At **Worthington Pump and Machinery Corporation**, Hobart C. Ramsey is now president; **John J. Summersby** is vice-president in charge of sales, with **Thomas J. Kehane**, assistant and general sales manager. **John P. McArthur** is new manager of West Coast Sales. The company is moving its water treating division to its Dunellen, N. J. Works.

**Dr. C. R. Payne** is new president of the **Electro-Chemical Supply and Engineering Co.**, Paoli, Pa., makers of a plasticized sulphur base pipe-jointing compound containing Thiokol, called "Wedgetite." **J. Wm. Grant**, vice-president, and **Walter L. Shepard, Jr.**, advertising and export sales manager, are also new here.



Dr. C. R. Payne

**Rockwell Mfg. Co.** of Pittsburgh, elects **Wm. A. Marsteller**, Chicago, and **Robert P. Melius**, Milwaukee, vice-presidents. **Joseph F. O'Grady** becomes assistant sales manager of the Water Meter Division.

Lacking space to list the new street addresses of **Link-Belt Company's** branch offices moving to larger quarters, we can only say that in Cleveland, Baltimore, Newark, or Huntington, W. Va., look them up first.

**E. A. Rutledge** goes up to vice-president in charge of sales and sales engineering for **Rensselaer Valve Co.**, at Troy, N. Y., a subsidiary now of **Neptune Meter Co.**

**Atlas Mineral Products Co.** at Mertztown, Pa., has appointed **Edison Sickman** manager of its Middle Atlantic sales district, and **George P. Gabriel**, engineer.

**Allis-Chalmers** offers a new 16-mm sound film in color dramatizing the story of an engineering student discouraged with his choice of profession. How much more engineering is than just blueprints and mathematics is the theme of this 26-minute "Hidden World" film, available on request from **Allis-Chalmers Manufacturing Company**, Advertising and Industrial Press Department, Milwaukee 1, Wis.

### PUSH PIPE

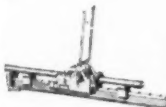
### UNDER STREETS, WALKS,

### TRACKS, FLOORS



### ...with a GREENLEE PIPE PUSHER

Yes, here's the quick and simple way to install underground pipe. With a **GREENLEE Hydraulic Pipe Pusher** one man pushes pipe under obstacles. No tearing up of pavement, lawns, floors... eliminates extensive ditching as just a short trench accommodates the Pusher. No tedious tunneling, back-filling, tamping, or re-paving. Job time is cut to a fraction. Pusher often pays for itself through labor savings on the first job or two.



**No. 790 GREENLEE PUSHER**  
For 3.4 to 4-inch pipe. Six Speeds—6,500 to 40,000 lbs. pushing pressure.



**No. 795 GREENLEE PUSHER**  
For pipe larger than 4-inch, concrete sewer pipe, large drainage ducts. Six speeds—25,000 to 150,000 lbs. pushing pressure.



**POWER PUMP** for both sizes of GREENLEE Pushers. Pushes pipe at rate of two feet per minute.



Get facts on timesaving Greenlee tools now. Write **Greenlee Tool Co.**, Division of **Greenlee Bros. & Co.**, 2048 Columbia Avenue, Rockford, Illinois, U. S. A.